Wallowa Falls Hydroelectric Project
FERC No. P-308

Before the
United States of America
Federal Energy Regulatory Commission

Final License Application for Minor Water Power Project Under 5MW

Volume II of V
Exhibit E – Environmental Report

Prepared by:
PacifiCorp Energy
Hydro Resources
825 NE Multnomah, Suite 1500
Portland, OR 97232

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Wallowa Falls Hydroelectric Project
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FINAL LICENSE APPLICATION
FOR MINOR WATER POWER PROJECT UNDER 5MW

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
ARPA	Archaeological Resources Protection Act
BMP	best management practices
BMTS	Bird Mortality Tracking System
BPL	lower bypassed reach
BPU	upper bypassed reach
CFR	Code of Federal Regulations
Corps	Army Corps of Engineers
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CTCR	Confederated Tribes of the Colville Reservation
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DEV	Developed
DEQ	Oregon Department of Environmental Quality
DO	dissolved oxygen
DSL	Department of State Lands
DSSMP	Dam Safety Surveillance and Monitoring Plan
EA	environmental assessment
EFI	East Fork inflow
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
GIS	Geographic Information System
GPS	global positioning satellite
GWh	Gigawatt hours
Ha	hectare
IFIM	instream flow incremental methodology
ILP	Integrated Licensing Process
km	Kilometers
kVA	Kilovolts
kW	kilowatt
kWh	kilowatt-hour
MIS	Management Indicator Species
NEPA	National Environmental Policy Act

NGO	non-governmental organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NPT	Nez Perce Tribe
NRHP	National Register of Historic Places
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OHWM	ordinary high water mark
OPRD	Oregon Parks and Recreation Department
ORBIC	Oregon Biodiversity Information Center
PAD	Pre-Application Document
PAG	Plant Association Group
PCEs	Primary Constituent Elements
PHABSIM	Physical Habitat Simulation System
PLC	Programmable Logic Control
PLP	Preliminary Licensing Proposal
Psi	pounds per square inch
RHCA	Riparian Habitat Conservation Area
PM&E	protection, mitigation and enhancement
RL	reporting limits
RV	Recreational Vehicle
SCADA	Supervisory Control and Data Acquisition
SCORP	Oregon Statewide Comprehensive Outdoor Recreation Plan
SD	Scoping Document
SD1	Scoping Document 1
SD2	Scoping Document 2
SHPO	State Historic Preservation Officers
TCP	Traditional Cultural Properties
TDG	total dissolved gas
THPO	Tribal Historic Preservation Officers
USFS	United States Forest Service
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VRM	Visual Resource Management
VQO	Visual Quality Objectives
WFC	West Fork confluence
WWNF	Wallowa-Whitman National Forest

Appendices

(see Volume III)

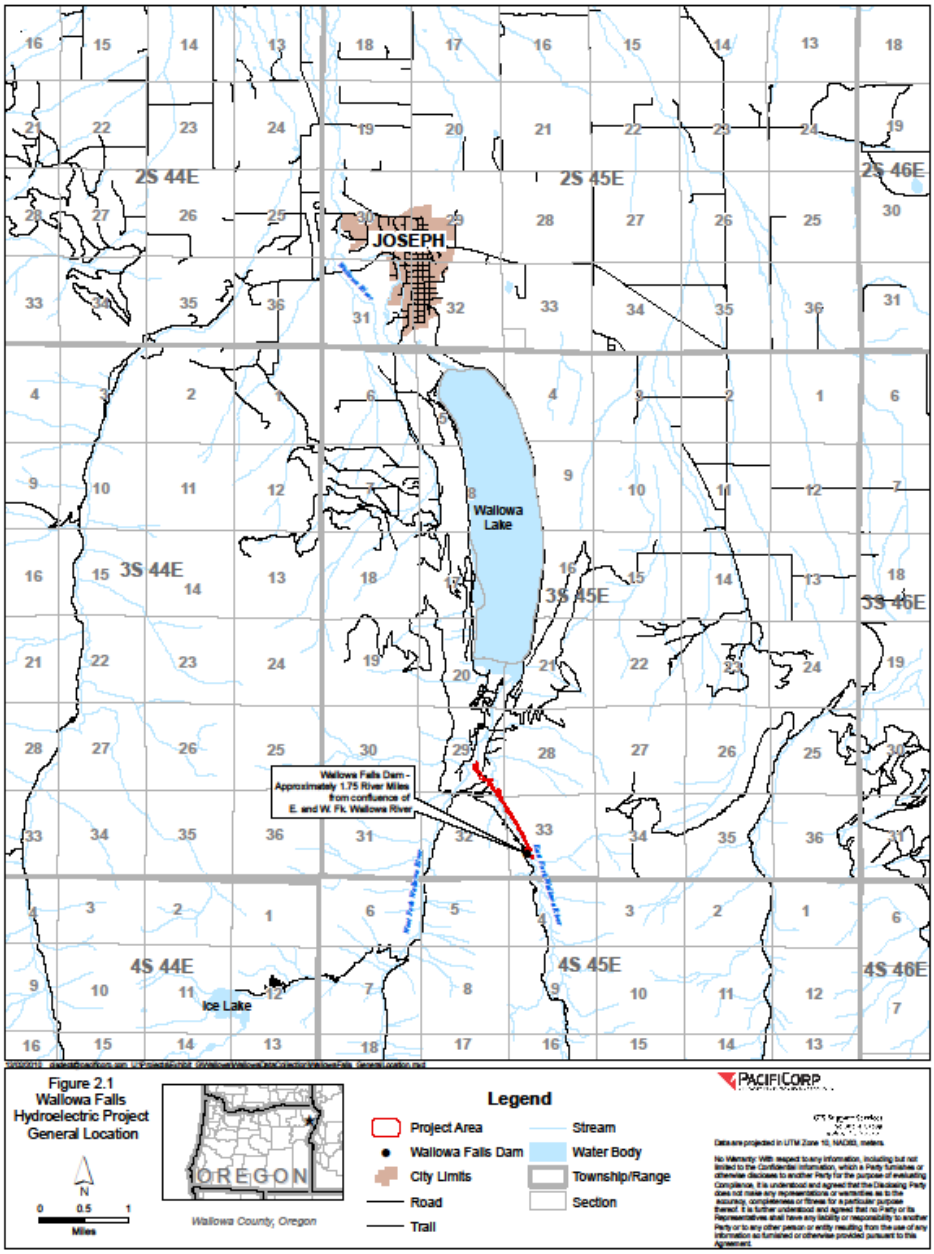
1.0 INTRODUCTION

1.1 Application

On February 28, 2014, PacifiCorp Energy (PacifiCorp) filed this application for subsequent (new) minor license-Exhibit E (Exhibit E) for the Wallowa Falls Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or Commission) Project No. 308, on the East Fork Wallowa River, West Fork Wallowa River and Royal Purple Creek in Wallowa County, Oregon (Figure 1). The current license will expire on February 28, 2016. The Project has a generation capacity of 1,100 kilowatts (kW) and currently produces an average of 7,000,000 kilowatt hours (kWh) annually. The current Project boundary occupies 6 acres (2.4 hectares (ha)) of private land owned by PacifiCorp and 12 acres (4.9 ha) of federal land managed by the Wallowa-Whitman National Forest.

PacifiCorp is not proposing any modifications to the Project to increase generation capacity. However, PacifiCorp is proposing to construct approximately 1,000 feet (305 meters (m)) of buried 30-inch (76.2 centimeter (cm)) diameter pipe for the purpose of rerouting the Project tailrace from its current location discharging into the West Fork Wallowa River to the East Fork Wallowa River. This would result in the return of all generation flow to the lower 2,600 feet (793 m) of the fish habitat portion of the bypassed East Fork Wallowa River. The reroute structure would include appropriate energy dissipation and fish protection measures. In addition, PacifiCorp proposes to release 4 cubic feet per second (cfs) as measured at a new compliance gage location in the lower portion of the bypassed reach near the lower penstock trestle. This would significantly improve gaging accuracy at the compliance point. PacifiCorp proposes to amend the Project boundary to include the forebay access road, proposed buried tailrace, campground, and other Project facilities. The proposed Project boundary occupies a total of 28.3 acres (11.5 ha), 15.2 acres (6.2 ha) of private land owned by PacifiCorp, 0.4 acres (0.2 ha) of state land controlled by the Oregon Department of Transportation, and 12.7 acres (5.1 ha) of federal land managed by the Wallowa-Whitman National Forest (WWNF).

Figure 1. Location of the Wallowa Falls Hydroelectric Project, FERC No. 308, Oregon



1.2 Purpose of Action and Need for Power

1.2.1 Purpose of Action

The Commission must decide whether to issue a license to PacifiCorp 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.

The purposes of hydropower licensing and this Exhibit E are to assess the effects associated with the Project, identify the applicant's proposal for protection, mitigation and enhancement (PM&E) measures intended to address the effects, and assess the economic effects of continuing to operate the proposed Project. Important issues addressed in this document include protection of Endangered Species Act-listed bull trout, minimum flows in the bypassed reach, and recreation use and access.

PacifiCorp firmly believes that the measures presented here fairly address the multiple requirements of the Project; to provide in stream flows below the Project that protect and sustain aquatic species and habitat and balance power and non-power resources while providing a reliable power source to PacifiCorp's electric customers.

The PM&E measures presented in this document reflect PacifiCorp's proposals for the term of a new license. PacifiCorp began the licensing process in 2011 and since that time has been conducting studies and consulting with stakeholders on measures that best address the continued effects of Project operation on natural and social resources in the Project area. This Exhibit E meets the requirement of 18 CFR § 5.18 relating to Commission's Integrated Licensing Process (ILP) and is organized in sections as described below.

- Section 1.0 INTRODUCTION
- Section 2.0 PROPOSED ACTION and ALTERNATIVES
- Section 3.0 ENVIRONMENTAL ANALYSIS
- Section 4.0 DEVELOPMENTAL ANALYSIS
- Section 5.0 ADDITIONAL CONSIDERATIONS
- Section 6.0 LITERATURE CITED
- Section 7.0 LIST OF PREPARERS
- Section 8.0 CONSULTATION DOCUMENTATION

Within each subsection of Section 3.3 – Proposed Action, the existing environment is described, effects of continuing Project operations on each resource area identified, and the benefit of each measure analyzed.

1.2.2 Need for Power

The Wallowa Falls Hydroelectric Project would provide renewable hydroelectric generation to meet a portion of local power requirements, resource diversity, and capacity needs in a remote rural area (Wallowa County, Oregon) of PacifiCorp's service territory. The Project would have an installed capacity of 1,100 kW and generate approximately 5,500,000 kWh per year.

The North American Electric Reliability Council (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Wallowa Falls Hydroelectric Project is located in the Western Electricity Coordinating Council (WECC) of the NERC. Due to its run-of-the-river operation and relatively small installed capacity, the Project is not considered to be a significant contributor to peak power demand or load growth in the WECC region.

Power from the Wallowa Falls Hydroelectric Project would help meet a need for local base-load power during the term of a new license. The Project provides power that displaces non-renewable, fossil-fired generation and contributes to a diversified generation mix. Displacing the operation of fossil fueled facilities may avoid some power plant emissions and creates an environmental benefit.

1.3 Statutory and Regulatory Requirements

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Under section 18 of the FPA, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service have the authority to prescribe fishways at projects. As of the time of this filing, no prescriptions have been filed and neither agency has requested a reservation of authority to prescribe fishways in the future.

1.3.1.2 Section 4(e) Conditions

As of the time of this filing, no federal land management agencies submitted conditions pursuant to section 4(e) of the FPA to protect and ensure proper use of public lands (reservations) occupied by the project.

1.3.1.3 Section 10(j) Recommendations

As of the time of this filing, no state and federal agencies have submitted recommendations pursuant to section 10(j) of the FPA.

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. PacifiCorp will apply to the Oregon Department of Environmental Quality (Oregon DEQ) for 401 water quality certification (WQC) for the Wallowa Falls Project no later than 60 days from the date the Commission issues the notice of acceptance and ready for environmental analysis. The Oregon DEQ will review the application and identify the conditions of the certification. The Commission will incorporate these conditions into the new license for the Project.

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 modification of the critical habitat of such species. Seven federally listed species (three plant species, three wildlife species, and one fish species) are known to occur in the Wallowa Falls Project vicinity (Table 25). There is also critical habitat for bull trout in the Project bypassed reach (East Fork Wallowa River and nearby West Fork Wallowa River. An analysis of Project impacts on threatened and endangered species is presented in section 3.3.5, *Threatened and Endangered Species,* and in the Biological Assessment (PacifiCorp, 2014) filed with the Commission under separate cover. Proposed protection and enhancement measures are in section 2.2.

The BA, concludes that the proposed Project will have no effect on the three listed plant and three listed wildlife species. Regarding listed bull trout, the BA concludes that the proposed action will result in more than negligible probability of "take" of juvenile and adult bull trout, and therefore a finding of **may affect, likely to adversely affect** for the species as defined in *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998a).

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 certificate of consistency with the state's CZMA program.

The Project is not located within the state-designated Coastal Management Zone, which extends inland to the crest of the Coast Mountain Range, and the Project would not affect Oregon's coastal resources. Therefore, the Project is not subject to Oregon coastal zone program review and no consistency certification is needed for the action. By email dated September 3, 2013 the Oregon Department of Land Conservation and Development concurred.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires that every federal entity "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places.

To meet the requirements of section 106, the Commission will review the cultural resource information provided in this license application and determine if it is necessary to execute a Programmatic Agreement (PA) for the protection of historic properties from the effects of the operation of the Wallowa Falls Project. The terms of the PA would ensure that the licensee address and properly treat all historic properties identified within the Project's area of potential effects (APE) through the implementation of a Historic Properties Management Plan or other protection measures.

1.3.6 Pacific Northwest Power Planning and Conservation Act

Under section 4 (h) of the Pacific Northwest Power Planning and Conservation Act, the Northwest Power and Conservation Council developed the Columbia River Basin Fish and Wildlife Program to protect, mitigate, and enhance the operation of the hydroelectric projects within the Columbia River Basin.

The Project is exempt from the Pacific Northwest Power Planning and Conservation Act due to it being an existing development.

1.3.7 Wild and Scenic Rivers Act

Section 7(a) of the Wild and Scenic Rivers Act requires federal agencies to make a determination as to whether the operation of the Project under a new license would invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the designated river corridor.

The Project is not within or adjacent to a river segment included in or under study for inclusion in the National Wild and Scenic Rivers System or State protected status. A 10-mile section of the Wallowa River from its confluence with the Minam River to its confluence

with the Grande Ronde River was designated Wild and Scenic in 1996. This section is approximately 45 miles downstream of the Project.

1.3.8 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1996 established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA Section 305(b)(2)). Adverse effect means any impact that reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The waterways upstream of the irrigation dam at the terminus of Wallowa Lake are listed as Essential Fish Habitat for spring Chinook and Coho under the Magnuson-Stevens Fishery Conservation and Management Act (NOAA 2008). A detailed discussion of the effects of the proposed Project on EFH is provided in Section 3.3.3.1

Using the USFWS's *Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998), PacifiCorp's BA for federally listed bull trout provides an analysis of effects of continued operation of the Wallowa Falls Hydroelectric Project on nine primary constituent elements (PCEs) within the action area that are collectively used to assess impacts to designated critical habitat. This analysis concluded that the proposed action **may affect, and is likely to adversely affect** designated Critical Habitat for bull trout. The analysis is not directly relevant to an assessment of potential effects on Pacific Salmon EFH in all cases. However, shifting of forebay flushing to the June high flow period and increased minimum flows in the bypassed reach will benefit Pacific Salmon EFH. Based on this analysis, and the PM&Es described in this license application, continued operation of the Wallowa Falls Hydroelectric Project will have **minimal adverse effect to EFH.**

1.3.9 Other Statutes as applicable

The Wilderness Act of 1964, directed the Secretaries of Agriculture and Interior, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within the National Forest, National Wildlife Refuge, and National Park Systems to recommend to the President the suitability of each such area for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on a designated area.

No Project lands are designated as or are under study for inclusion as a Wilderness Area or component of the National Trails System. The Eagle Cap Wilderness boundary is approximately 0.5 miles south of the Project forebay.

1.4 Public Review and Comment

The Commission's regulations (18 CFR, sections 5.1-5.1.6) 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 Endangered Species Act, the National Historic Preservation Act and other federal statutes.

1.4.1 Scoping

Before preparing this FLA, the FERC conducted scoping to determine what issues and alternatives should be addressed. A scoping document (SDI) was distributed to interested agencies and others on April 22, 2011. It was noticed in the Federal Register on April 22, 2011. Two scoping meetings were held on Tuesday, May 24, 2011 at 10:30am and an evening meeting at 7:00pm in Enterprise, Oregon to request oral 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. In addition to comments provided at the scoping meetings, the following entities provided written comments:

COMMENTING PARTY	COMMENT FILING DATE
Oregon Wild	June 13, 2011
National Park Service	June 21, 2011
U.S. Forest Service	June 23, 2011
U.S. Fish and Wildlife Service	June 23, 2011
Oregon Department of Fish and Wildlife	June 23, 2011

A revised Scoping Document (SD2), addressing these comments, was issued on August 4, 2011.

1.4.2 Interventions

To date no motions to intervene have been filed with the Commission.

1.4.3 Comments on the Preliminary Licensing Proposal

The Preliminary Licensing Proposal (PLP) was provided to participating agencies, tribes, NGOs, and the public for review and comment. As provided by 18 CFR § 5.16(e), agency

and stakeholder comments were filed on the PLP. Comments to the Commission were sent by the following:

Organization	Contact Name	Comment Date
USFS 1550 Dewey Avenue Baker City, OR 97814	John Laurence, Field Supervisor	12/10/13
FERC, Hydropower Licensing Division 825 First Street, N.E. Washington D.C 20426	Jennifer Hill, Chief	12/11/13
ODEQ 700 SE Emigrant Avenue, Suite 330 Pendleton, OR 97801	John Dadoly, Basin Coordinator	12/18/13
USFWS, La Grande Fish & Wildlife 3502 Hwy 30 LaGrande, OR 97850	Gary S. Miller, Field Supervisor	12/24/13
Oregon Department of Fish & Wildlife 107 20th Street La Grande, OR 97850	Elizabeth Moats, Hydropower Coordinator NE Region	12/30/13
Oregon Parks & Recreation 725 Summer St., NE, Suite C Salem, OR 97301	Jim Morgan, Stewardship Manager	12/30/13

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 No-action Alternative

2.1.1 Existing Project Facilities

The Project was initially constructed in 1921 by the Enterprise Electric Company with a generating capacity of 800 kilovolts (kVA). The original license was issued on June 27, 1924 and expired on March 31, 1974. On October 19, 1928 the Commission approved the transfer of the license to the Inland Power and Light Company. By order dated November 23, 1942, the Commission approved the transfer of the license from Inland Power and Light Company to Pacific Power and Light Company[1]. At the time of completion, the Project replaced several small generation sources in the Wallowa Valley and was connected to an existing transmission line servicing the communities of Joseph, Enterprise, Lostine and Wallowa. By order issued April 8, 1929 the Commission amended the license to include the construction of minor Project works for the diversion of water from Royal Purple Creek. In

[1] Pacific Power and Light Company is a prior company name of PacifiCorp Energy.

1967 the original generator was replaced with a new 1,375 kVA (1,100 kW) unit which is still in service. By order dated March 29, 1976 the Commission issued a new license for the Project for a period of ten years. The current license was issued on August 28, 1986 for a period of thirty years. Detailed maps showing lands and waters within the proposed Project boundary, land ownership and Project facilities are provided in Appendix A.

The existing Project consists of:

(1) a 2-foot-high (0.6 m), 9-foot-long (2.7 m) concrete diversion dam, having a 1-foot-wide (0.3 m) spillway, at elevation 5,838 feet (1.780 m) on Royal Purple Creek which is a tributary to the East Fork Wallowa River;

(2) a 240-foot-long (73.1 m), 8-inch (20.3 cm) diameter pipeline (120 feet of wood-stave pipe and 120 feet of PVC pipe) conveying water from the Royal Purple diversion to the Wallowa Falls forebay, 200 feet (61 m) upstream of the East Fork Wallowa River dam;

(3) an 18-foot-high (5.5 m), 125-foot-long (38.1 m), buttressed rock-filled timber crib dam with impervious gravel and asphalt core, having a 30-foot-wide (9.1 m) spillway, at elevation 5,795 (1,766 m) feet on the East Fork Wallowa River;

(4) a 0.2-surface-acre (0.08 ha) forebay;

(5) a partially enclosed power intake structure containing a 24 by 24-inch square (61 x 61 cm) sluice gate (headgate). The three-sided concrete intake enclosure prevents damage to the headgate from rocks, sediment, and other debris. Water to be used for generation flows over the top of the enclosure through an inclined steel trash rack;

(6) a low level sluiceway consisting of a vertical steel trash rack, a 24-inch (61 cm) cast iron canal gate (sluice gate), and a 24-inch (61 cm) steel pipe that passes through the dam. The sluiceway is located adjacent to the power intake structure and continually provides 0.8 cfs of in-stream flow through a 3-inch (7.6 cm) nipple affixed into the center of the gate;

(7) a 5,688-foot-long (1,734 m) steel penstock running from the power intake structure through the dam to the powerhouse. The penstock constricts from 24-inch (61 cm) to 18-inch (45.7 cm) in a transition section immediately below the intake head gate. The majority of the penstock is buried with two small above ground sections supported on timber crib trestles. Heading down slope from the dam the 18-inch (45.7 cm) diameter steel pipe is buried until it transitions to aboveground approximately 400 pipe feet (122 m) below the dam. The elevated section of pipe is approximately 150 feet (46 m) long and sits on a timber crib trestle structure. Continuing down slope the penstock is buried. At approximately 3,000 feet (915 m) down slope from the dam the

penstock reduces to a 16-inch (40.6 cm) diameter pipe for the remainder of its length to the powerhouse. At approximately 4,500 feet (1,372 m) below the dam the penstock crosses the East Fork Wallowa River on an elevated timber crib trestle. This section of elevated pipe is approximately 90 feet (27 m) in length. The remainder of the penstock is buried to the powerhouse. The lower and upper penstock trestles were completely re-built in 1999 and 2000 respectively;

(8) a powerhouse containing a single generating unit with a rated capacity of 1,100 kW operating under a head of 1,168 feet (356 m) producing an average annual energy output of 7.0 GWh;

(9) from the powerhouse, a 40 foot-long concrete lined tailrace flume discharges into a 2,305 foot-long (702 m), unlined tailrace channel. As shown in Appendix A, page 3, Project flows are discharged into the West Fork Wallowa River, approximately 1,000 linear feet (305 m) from the powerhouse. However, approximately 200 feet (61 m) below the concrete lined tailrace, the unlined portion of the tailrace bisects into two separate channels, a southern "main channel" and a northern "side channel". Additionally, the side channel is braided in several places making a total unlined tailrace channel length of approximately 2,305 feet;

(10) a 20-foot-long (7 m), 7.2- kVa transmission line that connects to Wallowa Falls substation immediately adjacent to the powerhouse. The Wallowa Falls substation is connected to the local distribution grid. No other transmission lines are associated with the Project; and

(11) a 10 by 15 foot (3 by 5 m) storage shed that is situated approximately 100 ft. (30 m) southeast of dam

The normal maximum water surface area and normal maximum water surface elevation (mean sea level), and gross storage capacity of the Project impoundment (forebay) is:

- Area – 0.2 Acre Maximum
- Elevation – 5,792-ft (spillway), 5,795-ft (dam crest)
- Storage – Effectively none as the Project is operated as "run-of-the-river" with no peaking or flood control capability

The number, type, and minimum and maximum hydraulic capacity and installed (rated) capacity of the turbines or generators include:

Generator: One 1,375 kVA Allis-Chalmers Company synchronous generator rated at 80% power factor, 514 rpm, three-phase, 60 cycles, and 7200 volts.

Minimum Hydraulic Capacity: Turbine can be manually operated to 0 kW\0 cfs. During standard operation (automated mode) minimum capacity is approximately 200kW\3 cfs.

Maximum Hydraulic Capacity: 17.8-cfs

Turbine: One 48-inch (122 cm) diameter, 1,500 hp, George J. Henry Jr. impulse turbine with motorized needle valve. The turbine runner (pelton wheel) was replaced in 1996, with a unit manufactured by Canyon Industries.

Transmission: The only transmission line associate with the Project license is the 20-foot-long (6.1 m), 7.2-kVa transmission line that connects the powerhouse to the Wallowa Falls substation. The Wallowa Falls substation is then connected to a distribution line that serves residents and businesses by Wallowa Lake. This distribution line is a 6.7 mile-long (10.8 kilometer (km)), 23 kV line that connects the Wallowa Falls substation with PacifiCorp's Enterprise Substation.

The estimated dependable capacity is 505 kW. The average annual generation is 7,000,000 kWh. The average monthly generation is 502,000 kWh.

The State of Oregon has not made a navigability determination on the Wallowa River or its tributaries. However, the portions of the East Fork Wallowa River and Royal Purple Creek within the Project area appear too shallow or not wide enough to allow a boat to pass or to transport commercial timber. Therefore, PacifiCorp believes the East Fork Wallowa River and Royal Purple Creek are non-navigable.

During the current license term PacifiCorp made the following capital improvements to the Project dam structure and access:

In 1994 PacifiCorp completed a rebuild of the dam. The original timber crib dam was modified by the addition of a rock fill toe and embankment and the construction of an impervious gravel and asphalt core between the existing timber crib and the embankment rock fill. The spillway was widened from its original design width of 24-feet (7.3 m) to 30-feet (9.1 m) which increased its capacity by approximately 50 percent. The side walls of the spillway were constructed of rock filled gabion baskets and the full width and length of the spillway was sheathed with steel aircraft landing mats. A 3-foot (0.9 m) wide structural aluminum footbridge with railing was constructed to span to 30-foot (9.1 m) spillway.

For the dam rebuild Project PacifiCorp constructed a dirt access road to the forebay along the east side of the East Fork Wallowa River. The access road roughly follows the alignment of the original penstock construction trail. Two pedestrian foot bridges crossing the East Fork Wallowa River between the new access road and Forest Service Trail 1804 were also constructed. By order received September 18, 1995 the Commission approved PacifiCorp's revised Exhibit F-2 and F-4 for the diversion dam and forebay access road respectively.

The Exhibit G for the Project was never revised to include the forebay access road in the Project boundary. The approved Exhibit G for the Project is provided in Appendix B. Additionally; other Project features including the forebay access road, portions of the existing tailrace and the proposed tailrace are not in the current Project boundary. It is PacifiCorp's assumption that the Project boundary under the new license will include the forebay access road and other appropriate Project features. PacifiCorp therefore treated existing features such as the forebay access road as though they are within the Project area in conducting the relicensing studies. Additional studies of resource conditions in the vicinity of the proposed tailrace were also conducted.

The bypassed portion of the East Fork Wallowa River within and near the Project area is approximately 1.75 miles (2,800 m) long from the Project diversion dam to its confluence with the West Fork Wallowa River. Gradient in this reach is high, with the upper 1 mile (1,600 m) averaging 19 percent and the lower .75 mile (1,200 m) averaging 8.5 percent. Channel morphology within most of the upper reach is dominated mainly by steep bedrock, vertical waterfalls, and cascades over boulders; though the upper reaches are steep, the lower .5 mile (800 m) to the confluence with the West Fork is a shallower gradient consisting of numerous riffles and pools. Over the course of its length, the bypassed East Fork Wallowa River drops approximately 1,200 feet (365 m) from the dam to the confluence with the West Fork Wallowa River.

The East Fork Wallowa River is a snowmelt runoff stream. As such snow acts as an important flow regulator or storage mechanism, holding a significant proportion of the precipitation in the area during the winter and releasing it later in the year as it melts. Peak runoff occurs generally from May through mid-July, from melting snowpack. By late July, little snow is left in the Wallowa Mountains. Runoff recedes to low flows by August and September. Flows may increase in fall in response to autumn rains, but relatively low flows generally persist from late fall through winter due to freezing conditions in the contributing high-elevation watershed areas, which result in little or no direct runoff during this time.

As explained in the PAD (PacifiCorp 2011a), historic flow information for the Project area is largely confined to USGS stream flow data gathered at two locations in the Project vicinity over a 58-year period from October 1924 through September 1983. The two historic USGS gages were located in the Project tailrace (USGS Station 13324500) and in the East Fork one quarter mile (402 m) upstream of the confluence with the West Fork (USGS Station 13325000). The USGS also developed flow data for a third "reporting station" (USGS Station 13325001) that is a summation of data collected at the two gage sites. The data for the reporting station (USGS Station 13325001) represents the best data available for characterizing the hydrology of the East Fork in the Project vicinity.

Based on the 58-year period of record, average monthly minimum flows in the East Fork ranged from 7.7 cfs in March to 25.2 cfs in June, and average monthly maximum flows ranged from 14.6 cfs in March to 142.2 cfs in June. Average mean monthly flows in the East

Fork ranged from 11 cfs in February and March to 61 cfs in June. During the period of record, monthly flows met or exceeded 10 cfs 90 percent of the time, 14 cfs 50 percent of the time, and 45 cfs 10 percent of the time.

2.1.2 Project Safety

The Project has been operating for more than 27 years under the existing license. During this time, Commission staff has conducted periodic environmental compliance and operational safety inspections focused on ensuring that Project operations are within the terms of the license, and that the condition of the Project structures and routine maintenance conducted continue to ensure the safety of the public. As part of the relicensing process, Commission staff will continue to evaluate the adequacy of proposed Project facility changes under a new license. Special articles may be included in a new 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 license articles relating to construction, operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The Wallowa Falls Hydroelectric Project is operated as a run-of-the-river Project. The current license does not specify any daily/seasonal ramping rates, flushing flows, reservoir operations, or flood control operations. Following the installation of an automated control system in 1996 the Wallowa Falls plant is now designed for unmanned operation and is controlled by a programmable logic controller. The normal mode of operation is for the plant to be unattended. A local Project operator is located in Enterprise, Oregon and visits the Project on a monthly basis and as called out by PacifiCorp's Hydro Control Center located in Ariel, Washington. The Hydro Control Center monitors the Project operations remotely and notifies the local operator when an issue arises. Prior to 1996 the Project was manually operated locally. In 1996, an automated control system was installed at the Project. The penstock pressure, generator load, forebay level, needle valve percent open position, generator stator temperature and front bearing temperature are all now monitored by the Supervisory Control and Data Acquisition (SCADA) system at the Wallowa Falls plant and are visible remotely to a Hydro Control Operator at the Hydro Control Center.

During most unit outage scenarios, the penstock headgate will remain open and the Project tailrace channel will remain watered up. Under all conditions of a forced unit outage (unit trip), a turbine needle valve will automatically close to a forty percent open position[2] and a deflector plate will engage to redirect the flow away from the turbine buckets and into the tailrace. The forty percent open position of the needle valve allows approximately 6 cfs of water to bypass the turbine and flow through the draft tube providing a continuous flow into

[2] Based on local plant operator knowledge.

the tailrace channel. As discussed above, an automated control system was installed at the Project in 1996 and the headgate control system was further modified in 2000. The normal mode of operation is for the plant to be unattended. The Programmable Logic Control (PLC) controls the shutdown relay on the generator unit. Fault shutdowns of the generating unit are automatic. However, there is no generator protection control or feedback control scheme on the penstock headgate in the PLC routine for the Wallowa Falls powerhouse. This means that switchyard trips or line frequency trips result in a generator unit trip but do not result in a headgate closure.

There are two conditions that will initiate a generator lockout, a headgate closure and the complete dewatering of the penstock and tailrace channel; loss of voltage to the gate control cable or a 'low penstock pressure' indication. As a result of the FERC mandated modifications, in 2000 a continuously energized solenoid valve was installed at the headgate and the powerhouse control system was modified to automatically close the headgate in the event that voltage is removed from the gate control cable. If voltage is removed from the cable due to a loss of power or damage to the wiring, the solenoid valve that operates the headgate is designed to release the oil from the cylinder whereby the weight of the headgate will cause it to drop to the closed position. The control system, as originally installed in 1996, will also automatically close the headgate in the event of a 'low penstock pressure' indication. A low penstock pressure indication would be the result of a penstock failure or a restricted inflow condition at the forebay intake caused by turbine outflow exceeding inflow. A pressure relay at the powerhouse senses any change in penstock pressure. If penstock pressure drops to approximately 430 pounds per square inch (psi), an alarm will be relayed to a Hydro Control Operator, located at the Hydro Control Center in Ariel Washington, who can make adjustments to correct a problem without a headgate closure. Any drop in penstock pressure below approximately 375 psi, such as a penstock rupture, triggers an automated signal to the headgate causing it to close and the unit to trip and lockout. In either of these scenarios, the headgate closes, the needle valve closes to a forty percent open position, the deflector plate engages, and the volume of the penstock drains through the generating unit over the course of approximately two hours, resulting in the dewatering of the Project tailrace. Additionally, debris in the needle valve, nozzle or damage to the turbine requires the headgate be closed to allow for clearing of debris or equipment repair.

The penstock pressure, generator load, forebay level, needle valve percent open position, generator stator temperature, and front bearing temperature are all monitored by the SCADA system at the powerhouse and are visible to a Hydro Control Operator at the PacifiCorp Hydro Control Center located in Ariel, Washington. Once the headgate at the forebay closes, it must be opened manually by a local operator at the forebay.

PacifiCorp has reviewed its records of forced outages for the Wallowa Falls generating unit for the period of March 1, 1986 through July 30, 2011. The results of that review were provided to the FERC in a letter dated August 8, 2011 titled Wallowa Falls Hydroelectric Project Outage Report from 3/1/1986 through 7/31/2011 (PacifiCorp, 2011b). All forced

outages greater than fifteen minutes were reported. The report provides each forced outage start date and time, the cause of the outage, an explanation of what occurred, and the outage end date and time. As explained above, under all generating unit trip conditions, with the exception of a loss of voltage to the headgate control cable, 'low penstock pressure indication' or an unanticipated malfunction at the headgate (e.g. lightning strike), water continues to flow, at approximately 6 cfs, past the turbine into the powerhouse tailrace channel. Any forced outages, and their durations, that resulted in a headgate closure are reported. Once the headgate closes at the forebay, it takes approximately two hours for the tailrace channel to completely dewater, and it will remain dewatered until the headgate is manually opened and the unit brought back online. Since the headgate control modifications became functional in 2000, approximately 31 headgate closures have been recorded due to forced outages.

Annual Project maintenance is routinely conducted between June and September each year and involves vegetation management on Project lands, erosion control or road maintenance activities and as-needed maintenance on the water conveyance system and generating unit. The timing and scope of annual maintenance activities are coordinated with the Wallowa-Whitman National Forest as provided in the Special-Use Permit issued for the Project by the U.S. Department of Agriculture, Forest Service (Forest Service). Throughout the history of the hydroelectric project native sediment has been routinely flushed past the Wallowa Falls dam during high runoff events and routine forebay flushes. Forebay flushes have historically occurred during annual maintenance, usually in the months of July or August during low flow conditions so as to allow the forebay to completely drain via the low level sluiceway pipe.

2.1.4 Existing Environmental Measures

The current license includes the following three articles which are considered environmental measures:

Article 401. The licensee shall maintain in the bypassed reach of the East Fork Wallowa River a continuous minimum flow of 0.5 cfs as measured immediately downstream from the dam or inflow to the reservoir, whichever is less, for the protection of fish and wildlife resources in the East Fork Wallowa River. This flow 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 and the Oregon Department of Fish and Wildlife.

Compliance for minimum stream flows is measured by a rated staff gage and level logger located in the bypassed reach of the East Fork Wallowa River directly below the diversion dam (FERC-compliance gage). Annual stream flow reports are submitted to the FERC and flows are reported as a daily average. PacifiCorp maintains minimum flows through a release of water from a low level sluice gate at the dam.

Article 402. The licensee shall restrict Project forebay flushing to the period from May 1 to August 30 of each year to protect Kokanee eggs and sac fry in the gravel areas above Wallowa Lake.

The current license does not specify any daily/seasonal ramping rates, flushing flows, reservoir operations, or flood control operations. As discussed in Section 2.1.3 above, PacifiCorp has flushed the Project forebay to reduce sediment build-up on a routine basis throughout the history of the Project.

Article 403. The licensee, before starting any ground-disturbing or land-clearing activities within the Project boundaries, other than that specifically authorized in this license, shall consult the Oregon State Historic Preservation Officer (SHPO) about the need for a cultural resources survey and salvage work. The licensee shall file with the Commission documentation of the management plan and a schedule to conduct the necessary investigation, together with a copy of a letter from the SHPO commenting on the plan and schedule, 60 days before starting any such ground-disturbing or land-clearing activities. The licensee shall make funds available in a reasonable amount for the required work. If the licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing Project works or other facilities at the Project, the licensee shall stop all construction and development activities in the vicinity of the sites and shall consult a qualified cultural resources specialist and the SHPO concerning the eligibility of the sites for listing in the National Register of Historic Places and any measures needed to avoid the sites or to mitigate effects on the sites. If the licensee and the SHPO cannot agree on the amount of money to be spent for Project specific archeological and historical purposes, the Commission reserves the right to require the licensee to conduct the necessary work at the licensee's own expense.

The majority of ground disturbing and land clearing activities within the Project boundaries conducted under the current license have been minor operation and maintenance disturbances authorized in the license. The SHPO was consulted for the 1994 dam rebuild project and a pedestrian survey was conducted. A detailed discussion of the survey effort and results is provided in the Wallowa Falls Hydroelectric Project, FERC No. P-308, Updated Study Report (Final Technical Report), Cultural Resources (PacifiCorp. 2013h).

Additional measures voluntarily provided by PacifiCorp at the Project include the following:

(1) Pacific Park, a 8 unit campground along the Project tailrace on lands owned by the company. Portions of the campground are outside the current Project boundary;

(2) The Project forebay access road provides public access to the bypassed reach and forebay on National Forest and company lands, and receives some hiking and equestrian use. As stated in Section 2.2.1, the majority of the forebay access road is outside the current Project boundary;

(3) There are a number of other user-defined trails on PacifiCorp property immediately adjacent to the Project but outside of the current Project Boundary.

2.2 Applicants Proposal

2.2.1 Proposed Project Facilities

Tailrace Reroute

PacifiCorp proposes to modify the Project tailrace by re-routing it from its current configuration discharging into the West Fork Wallowa River by constructing a buried 30-inch (76.2 cm) diameter, approximately 1,000-foot long (305 m), pipe discharging into the bypassed reach of the East Fork Wallowa River. Four conceptual design drawings of the tailrace reroute, including the intake and outfall structures, are provided in Appendix C. The new tailrace pipeline will convey the full powerhouse discharge, from the existing concrete lined powerhouse tailrace to the East Fork of the Wallowa River. The conveyance pipeline will consist of a reinforced concrete intake structure, buried pipeline, and reinforced concrete outfall structure. The intake structure will include an isolation gate at the pipeline entrance and a water level indicator connected to the existing forebay headgate control system. In the event the pipe intake becomes clogged and or begins to flood, the level indicator would send an alarm signal to the headgate control closing it and stopping flow down the penstock.

The outfall structure will include a velocity barrier which meets the requirements of Section 5.4 – Velocity Barriers in the 2011 NMFS Anadromous Salmonid Passage Facility Design (NMFS 2011) to prevent all fish species and life stages from entering the pipeline. The barrier structure will be designed to meet NMFS criteria at flows up to the ordinary high water elevation. During higher flows fish are seeking refuge and do not typically migrate. Fish exclusion specific to the species and life stages present during high flows will be evaluated during the final design. The structure will be designed for a minimum drop of 3-feet, 6-inches (1.06 meters). The outfall structure will discharge into an energy dissipation channel consisting of boulders, logs and/or woody debris to reduce erosion and scour in the East Fork Wallowa River side-channel and main channel habitats. The riprap is anticipated to have a maximum size of 12-inches, but the final size and details will be determined during final design. It is anticipated that the hydraulic energy can be dissipated in a newly constructed channel (15-25 feet long), although the improvements may extend into the lower reach of the existing side channel. No work is anticipated in the main channel.

Once the tailrace reroute pipeline is constructed and put into operation, the existing tailrace channels, which discharge to the West Fork Wallowa River, will no longer be needed for hydroelectric operations. The main tailrace channel currently located on the south side of the campground road will be retained to provide stormwater management and drainage in the

area. The braided tailrace side channels on the north side of the campground road will be reclaimed and restored to match surrounding contours.

Relocate Gage for Project Flow Monitoring

PacifiCorp proposes to install a new and improved gage to monitor instream flows in the East Fork bypassed reach between the Project Diversion dam and the proposed new tailrace discharge location. The data obtained from the new gage will provide verification that proposed modified instream flow releases to the East Fork bypassed reach are being implemented as planned.

PacifiCorp currently maintains a gage just downstream from the Project Diversion dam that serves as the existing compliance point for monitoring instream flow releases to the East Fork. The new gage will be located in the East Fork bypassed reach approximately 0.7 mi downstream of the Project Diversion dam near the existing forebay access road bridge site (see Appendix A for a map showing the new gage location). Several attributes make this location advantageous and preferable, including that this location: (1) is above the migratory fish barrier and will not entail gage construction or operation in bull trout critical habitat; (2) avoids high-gradient turbulent channel areas where it would be difficult to construct and maintain a gage; (3) provides the most suitable channel geometry for gage installation and accuracy; (4) is easily accessible for efficient and timely maintenance of the gage and downloading of data; and (5) is adjacent to existing Project features and is within the proposed FERC Project boundary.

The new gage will consist of a long-throated open flume installed in the channel. Long-throated open flumes have many advantages compared to other flow measuring devices, including that they are more accurate, have better technical performance, can be computer designed and calibrated to specific site conditions, and more effectively pass sediment and debris (Clemmens et al. 2001, Wahl et al. 2000). When installed, the long-throated open flume will provide a stable trapezoidal-shaped section of channel about 25-ft long and 20-ft wide. The open flume design includes a flat sill or crest that rises from the floor of the flume across the trapezoidal section. The flume's stable trapezoidal shape and crest allows flows passing through the flume to be controlled in a manner that allows flow discharge (in cfs) to be accurately quantified based on rating tables or hydraulic equations for flume structures. The ability to more effectively pass sediment and floating debris (e.g., woody debris) is a particularly important advantage of this type of flume for the East Fork bypassed reach.

Details of the design of the proposed flume are still being finalized. Conceptual design drawings of the proposed flume structure are provided in Appendix C. The proposed flume structure will consist of dimensions that are specifically designed to site conditions and that will emphasize flow measurement accuracy. Flow measurement accuracy is particularly important at the lower end of the flow range to verify the proposed modified instream flow release to the East Fork bypassed reach of 4 cfs. The flume installation will include a stilling

well fitted with a water level pressure transducer and datalogger for continuous (hourly) recording of water levels and flows.

Details of the construction and implementation of the proposed flume are still being determined. However, in general, construction and implementation activities for flume installation are expected to include (in order): equipment staging; site dewatering; excavation; construction of flume structure forms; concrete workings; backfilling of the completed flume structure; dewatering system removal; monitoring equipment installation (e.g., pressure transducer and datalogger); and post-construction site restoration. These construction and implementation activities will occur over an estimated 4 to 6-week period under low flow conditions.

The site dewatering activity will involve the temporary diversion of channel flows around the construction site. This temporary diversion will isolate the work area from flowing water, but will maintain flow to downstream portions of the stream during construction. The temporary diversion of channel flows will be accomplished by placing a temporary small cofferdam just upstream of the construction site to divert streamflow around the work area for a distance of about 150 ft or less. The cofferdam will be constructed of rock obtained from the immediate area, and the cofferdam's rock fill will be fitted with a gated pipe (of 18-in diameter or less) to capture and redirect the flows from upstream of and around the site.

The proposed flume will be composed of concrete that is cast in-place inside sealed formed structures until cured (approximately 3-5 days). The cofferdam-dewatering system will ensure that the flume site is isolated from contact with any flowing water during the construction of the forms and the process of pouring, finishing, and curing the concrete.

The extent of and amount of needed excavation is not known at this time. The flume installation will require some excavation to accommodate placement of the overall 25-ft long by 20-ft wide dimensions of the flume structure. It is expected that most excavation will involve cut-off walls surrounding the structure that will go down about 4 ft or to bedrock, whichever is first encountered. The cut-off walls are necessary to prevent erosion or undermining of the completed flume structure during high flows.

PacifiCorp and\or responsible contractors will obtain necessary approvals and permits for flume construction and implementation. PacifiCorp or responsible contractors will adhere to and implement the requirements of necessary approvals and permits, including (but not necessarily limited to) required or recommended measures or best management practices (BMPs) related to in-channel work, equipment use, materials handling, minimization of riparian and channel disturbance, sedimentation and erosion control, and post-construction site restoration.

Revise Project Boundary

PacifiCorp proposes to revise the Project boundary to include the proposed tailrace alignment and other appropriate Project features that are not in the current boundary such as the Royal Purple diversion and forebay access road. The proposed Project boundary occupies a total of 28.3 acres (11.5 ha), 15.2 acres (6.2 ha) of private land owned by PacifiCorp, 0.4 acres (0.2 ha) of state land controlled by the Oregon Department of Transportation, and 12.7 acres (5.1 ha) of federal land managed by the WWNF. Maps showing the current and proposed Project boundary are provided in Appendix A.

2.2.2 Proposed Project Operation

The Project would continue to be operated in run-of-river mode during all times of generation. The automated control system equipment would be set to divert no more than PacifiCorp's water right of 16 cfs, from the East Fork Wallowa River.

PacifiCorp will continue to operate the Project with the current tailrace configuration until June following the third anniversary of FERC license issuance. During this time, PacifiCorp will design, permit and construct the proposed tailrace reroute pipeline project. Although PacifiCorp plans to construct the tailrace reroute pipeline and associated intake and outfall structures between June and September of the third year following license issuance, to minimize effects to water quality and aquatic species, the pipeline will not be put into operation until the seasonal high-flow period (June) following construction completion.

During the three-year 'interim operations' period, when the current tailrace configuration will be used, PacifiCorp will continue to conduct a fish salvage of all tailrace channels anytime there is a planned or unplanned dewatering of the tailrace. As described in Section 2.1.3 there are limited operational scenarios under which the tailrace channels become completely dewatered. To further protect bull trout and kokanee, a fish exclusion weir will be installed annually prior to September 1, at the confluence of the tailrace with the West Fork Wallowa River to prevent fish spawning in the tailrace channels. A fish salvage of the tailrace channels will be completed prior to installation to ensure no fish are stranded in the tailrace behind the weir. The weir will be left in place through November 15, and will be monitored twice per week for the duration of installation period to assure performance. In the event that a fish exclusion weir is not installed in a given year, the tailrace channels will be dewatered and generation will cease between September 1, and November 15, to prevent fish spawning in the tailrace channels. Prior to any shutdown, a fish salvage of the tailrace channels will be conducted.

Beginning in June following the third anniversary of license issuance, the proposed tailrace reroute pipeline will be used for the discharge of all generation flows to the East Fork Wallowa River under normal operating conditions. While it is technically possible for the reroute intake structure or pipe to become clogged with ice or debris, an operational failure or

emergency situation of this nature is very unlikely and is expected to occur 0-to-1 times in the new license period.

To address operational failures or emergency situations, a water level indicator will be installed in the tailrace reroute collection basin that is connected to the existing forebay headgate control system. In the event the pipe intake became clogged, the level indicator would send an alarm signal to the headgate control closing it and stopping any flooding or damage to the generation equipment, powerhouse, and its immediate environment. This system would eliminate the need for the emergency spillway channel that was described in the Preliminary Licensing Proposal.

Sediment Management Program

It is necessary to flush accumulated native sediment from the Wallowa Falls Hydroelectric Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to modify the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period to flushing sediment from the forebay during spring-runoff in the month of June. Annual forebay flushing would result in the removal of accumulated sediment from the forebay and the mobilization and transport of that sediment into the bypassed reach of the East Fork Wallowa River. Based on a volumetric survey of native sediment entrained in the forebay in August 2012, conducted by Haner, Ross and Sporseen, P.C, approximately 250 to 500 cubic yards of native material would be flushed annually.

Schedule and Timing

Sediment would be flushed routinely, likely annually, from the Project forebay during the month of June when seasonal high-flows would easily transport fine sediment through the bypassed reach. June is also the period identified as having the least potential impacts to fish, as both kokanee and bull trout fry have emerged from the gravels and it is well before the fall spawning period for both species.

There is no real-time stream gaging or communications capabilities at the Project, and given the remoteness of the Project, PacifiCorp does not have the ability to schedule forebay flushing in response to real time flows. However, it is PacifiCorp's intent to flush prior to or during the annual high flow period in the East Fork, which historically occurs in June. To reduce uncertainty around the adequacy of June flows, we propose a threshold flow, above which mobilization of small (<2 mm) particles would be expected to occur within the East Fork Wallowa River bypassed reach. Based on the analysis provided in Section 3.3.1, PacifiCorp proposes that flushing occur during June, as early in the high flow season (to allow subsequent peak flows to transport sediment) as possible and not at flows less than 15 cfs, and to the extent possible at flows above 20 cfs.

If the forebay is not flushed during a given year due to low flows, site access issues or operational or maintenance issues it would not be flushed until June of following year.

Flushing Method

Sediment retained in the Project forebay would be flushed through or over the dam, via the low-level outlet pipe or the dam spillway respectively, into the bypassed reach of the East Fork Wallowa River. To facilitate flushing, the penstock intake gate would be closed and the slide gate on the low-level pipe at the base of the diversion dam would be fully opened. Project inflow, up to the hydraulic capacity of the pipe, would pass through the low-level outlet pipe. Project inflows in excess of the hydraulic capacity of the low-level outlet pipe would spill over the dam. Several people operating hydraulic pumps (fire pumps) with hoses affixed to rigid poles would be stationed around the perimeter of the forebay. The pump hoses would be used to hydraulically mobilize and suspend forebay sediments in the water column to facilitate sediment transport through the low-level outlet pipe or over the dam into the bypassed reach. Flushing would not exceed 72 hours. At the end of the flushing period, the low-level outlet pipe slide gate would be closed and the penstock gate re-opened to resume generation and normal Project operation.

Monitoring

It is expected that there will be short-term increases in turbidity during forebay flushing; PacifiCorp would monitor turbidity as described in the Turbidity Monitoring Plan for Maintenance Forebay Flushing included in Appendix D.

2.2.3 Proposed Environmental Measures

2.2.3.1 Construction of Proposed Facilities

In their comment letter on the Preliminary Licensing Proposal (dated December 11, 2013) the FERC requested PacifiCorp develop and file with the license application, a conceptual Erosion and Sediment Control Plan (ESCP) for the proposed tailrace reroute to the East Fork Wallowa River. It is PacifiCorp's intention to develop an ESCP including the elements in the FERC request, upon acceptance of a new license when it is certain the facility will be built. The following general measures are proposed for construction actions and may be used for an environmental assessment of the proposed facilities.

- Obtain all necessary local, state and federal permits.
- Hold a pre-construction meeting to review all permit conditions, BMPs, and monitoring and inspection protocols.
- Identify and demarcate buffer zones around active construction areas.
- To the extent practical, developed areas (e.g., existing roadways and parking areas) will be utilized for access and materials/equipment staging.

- Erosion and pollution control measures will meet or exceed best management practices (BMPs) and other performance standards contained in the applicable state and federal permits.

- A location for generator and equipment refueling will be designated prior to the start of any construction or maintenance activities. The location will be away from the waterway and on level stable ground. An appropriate containment vessel or technique will be utilized when refueling to catch spills or leaks.

- All vehicles and equipment on site will be monitored for petroleum leaks and receive regular preventive maintenance to reduce the chance of leakage.

- Petroleum products will be stored in tightly sealed containers which are clearly labeled.

- Spill cleanup materials will be stored on-site inside the existing storage shed. In the event that a spill occurs, maintenance staff will contain and clean the spill immediately, and dispose of contaminated soils appropriately. All applicable regulatory procedures will be observed.

- PacifiCorp shall ensure that any fill materials that are placed for the proposed habitat improvements in any water of the state do not contain toxic materials in toxic amounts.

- All disturbed soils will be graded and revegetated. All disturbed soils will be graded and revegetated as soon as possible following the ground disturbance activity with priority given to native species that are locally adapted.

- PacifiCorp shall ensure all fill material applied should be free of noxious weed propagules.

- Any tree removal required by the Project will occur outside of the migratory bird nesting season (March 1 to July 31) to avoid impacts to nesting birds.

- Work areas behind temporary cofferdams or isolated work areas below the ordinary high water mark (OHWM) will be dewatered with pumps. All pumped water will be discharged to unsaturated upland vegetated areas for infiltration. Infiltration areas will be monitored daily by a qualified Construction Inspector to ensure that all discharged water is infiltrating and there is no erosion, surface or subsurface runoff occurring. If an area becomes saturated an alternative discharge area will be located.

- All water intakes used for a construction project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated, and maintained according to National Marine Fisheries Service (NMFS) fish screen criteria.

- Before and intermittently during pumping to isolate an in-water work area, attempt to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury. The entire capture and release operation will be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all Endangered Species Act (ESA) listed fish. The work will comply with the requirements in the U.S. Fish and Wildlife Service (USFWS) biological opinion issued with the new license and PacifiCorp's State Scientific Collection Permit issued by Oregon Department of Fish and Wildlife (ODFW).

- All construction debris shall be properly disposed of on land so that the debris cannot enter the waterway or cause quality degradation of state waters. Retention areas, swales or impoundments will be used to prevent discharge of water from construction staging areas.

Environmental effects and resource protection measures are discussed in greater detail in the following resource specific sections.

2.2.3.2 Operation

PacifiCorp Proposes to:

- Operate the Project releasing a year-round minimum in-stream flow of 4 cfs into the East Fork Wallowa River as measured at the proposed relocated FERC-compliance gage, or inflow, whichever is less;

- As discussed in Section 2.2.2 Implement a sediment management program for forebay maintenance flushing;

- Incorporate a routine (5 year interval) geologic hazard assessment into the Dam Safety Surveillance and Monitoring Plan (DSSMP) for the Wallowa Falls Project. The assessment will be performed by a qualified geotechnical engineer and/or engineering geologist and will evaluate the condition of known hazards and identify any new hazards that may have developed. The assessment will be submitted to the Division of Dam Safety and Inspections and will be accompanied by a plan and schedule to address any hazards that represent a tangible threat to Project features and/or public safety.

2.2.3.3 Geology, Sediment and Substrate

PacifiCorp proposes to:

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);
- As discussed in Section 2.2.2 Implement a sediment management program for forebay maintenance flushing;
- Incorporate a routine assessment of geologic hazards at the Project into PacifiCorp's DSSMP for the Project;
- Incorporate a routine access road inspection and maintenance plan for PacifiCorp's dam and forebay access road within the Project boundary.

2.2.3.4 Water Resources

PacifiCorp Proposes to:

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);
- Schedule commissioning operation of the tailrace reroute pipeline for the seasonal high-flow (June) period when background turbidity levels and sediment transport within bypassed reach of the East Fork Wallowa River is generally higher;
- Operate the Project with increased instream flow releases in the bypassed reach (release 4 cfs as measured at the proposed relocated compliance gage and full powerhouse flow at the point of tailrace reroute discharge);
- Conduct in-stream flow compliance monitoring in the bypassed reach ;
- Implement a sediment management program for forebay maintenance flushing;
- Implement a turbidity monitoring plan for forebay maintenance flushing.

2.2.3.5 Fish and Aquatic Resources

PacifiCorp Proposes to:

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);

- Reroute the Project tailrace from its current location discharging into the West Fork Wallowa River to the East Fork Wallowa River. This would result in the return of all generation flow to the lower 2,600 feet (793 m) of the fish habitat portion of the bypassed East Fork Wallowa River. This will improve aquatic habitat in the affected portion of the bypassed reach and eliminate the potential to strand or dewater aquatic species in the existing Project tailrace;

- Schedule initial operation of the tailrace reroute pipeline for the seasonal high-flow (June) period when background turbidity levels and sediment transport within the bypassed reach of the East Fork Wallowa River is generally higher;

- During the three-year 'interim operations' period, when the current tailrace configuration will be used, PacifiCorp will continue to conduct a fish salvage of the tailrace channels anytime there is a planned or unplanned dewatering of the tailrace.

- A fish exclusion weir will be installed annually, prior to September 1, at the confluence of the tailrace with the West Fork Wallowa River to prevent fish spawning in the tailrace channels;

- Operate the Project releasing a year-round minimum in-stream flow of 4 cfs as measured at the FERC-compliance gage at the proposed location near the lower penstock trestle, or inflow, whichever is less. This will improve aquatic habitat between the natural fish barrier (falls) and the location of the proposed tailrace discharge;

- Conduct in-stream flow compliance monitoring in the bypassed reach;

- Implement a sediment management program for forebay maintenance flushing that minimizes impacts to aquatic habitat and species.

- PacifiCorp will comply with the Oregon State Aquatic Invasive Species Prevention Program requirements to minimize risk of aquatic invasive species introduction to the Project boundary.

2.2.3.6 Wildlife and Terrestrial Resources

PacifiCorp Proposes to:

- Implement a noxious weed management plan to control and minimize the spread of noxious weeds on all lands (USFS and PacifiCorp owned) within the Project boundary;

- Implement a Vegetation Management Plan to minimize the potential risk that hazard trees and other vegetation that may pose to facilities, operations, public safety, or personnel;

- Implement BMPs for sediment and erosion control during Project construction activities (as listed above under measures for Construction);

- Permit and/or mitigate the wetland loss associated with the proposed tailrace reroute according to all Federal, state, and local permits;

- Implement a sediment management program for forebay maintenance flushing that minimizes impacts to riparian vegetation, amphibians, and other aquatic wildlife.

- PacifiCorp will comply with the Oregon State Aquatic Invasive Species Prevention Program requirements to minimize risk of aquatic invasive species introduction to the Project boundary.

2.2.3.7 Recreation Resources

PacifiCorp Proposes to:

- Coordinate with the USDA-FS and OPRD to provide recreation opportunities within the FERC Project boundary (primarily improvements to Pacific Park Campground and the portion of the Project within the FERC Project boundary that is located within the WWNF) and on PacifiCorp lands in the vicinity of the FERC Project boundary but outside it (primarily related to trails and trail information).

PacifiCorp proposes to implement the following recreation improvements at Pacific Park Campground and at the slope and ridge between Pacific Park Campground and the West Fork Wallowa River Gorge:

- Install a new entry sign at Pacific Park Campground;

- Construct a campground host area at Pacific Park Campground;

- Construct a new flush toilet that will be compliant with the Americans with Disabilities Act (ADA);

- Improve campsite identification signage at Pacific Park Campground;

- Restore tent/vehicle pads at Pacific Park Campground;

- Remove Stumps and Logs at Pacific Park Campground;

- Construct a new, formalized access trail from Pacific Park Campground to the ridge west of the Campground and east of the West Fork Wallowa River Gorge. The formalized trail would connect with the existing well established user-created trail on the top of the ridge that heads south to connect with the WWNF Chief Joseph Mountain (#1803) and West Fork (#1820) trails. PacifiCorp would decommission and reclaim other user-created trails on the slope west of Pacific Park Campground; and

- Install a one panel trailhead sign and wilderness registration station at the start of (near the Campground) the new formalized access trail to the ridge described above;

PacifiCorp proposes to implement the following recreation improvements in the vicinity of the terminus of the Joseph-Wallowa Lake Highway, Project powerhouse, and along the forebay access road:

- Replace and relocate the existing Wallowa Lake Trailhead sign/wilderness registration station with a new trailhead sign and registration station that will be similar in design to other signs that will be developed as part of these measures;

- Build a new trail from the new Wallowa Lake Trailhead sign/wilderness registration station that will lead to the forebay road/access trail that leads to the East Fork and West Fork trails;

- Install a three panel interpretive sign at the terminus of the Joseph-Wallowa Lake Highway and Wallowa Lake Trailhead;
- Replace the existing cable barrier across the maintenance access road near the terminus of the Joseph-Wallowa Highway turnaround with a metal gate; and

- Install new directional trail signs near the beginning of the new trail from the new Wallowa Lake trailhead sign to forebay access road, along the forebay access road and existing access trail at turnoff locations to the forebay access road, the East Fork Trail, and West Fork Trail. Install a new directional sign (near the Wallowa Lake

State Park maintenance facility) at the trail used by horse packers to reach the existing access trail to the forebay access road and the WWNF.

PacifiCorp proposes to implement the following recreation improvements in the Project boundary located within the WWNF:

- Improve the drainage at the trail that provides access between the forebay access road and East Fork Wallowa River Trail by constructing a turn pike drainage structure per WWNF standards;

- Install a one panel interpretive sign at the west side of forebay.

- Improve year-round pedestrian recreational access across the dam spillway catwalk.

2.2.3.8 Aesthetic and Visual Resources

PacifiCorp proposes to implement an aesthetic and visual resource management program that better blends Project facilities with the surrounding environment. Specifically, the program includes the measures below:

In the vicinity of the Project forebay (located within the WWNF) PacifiCorp proposes to implement the following aesthetic and visual resource measures:

- Improve the appearance of the forebay intake structure by installing wood shake-siding to the exterior and roof of the equipment house;

- Improve the appearance of the laydown and storage area on east side of forebay;

- Enhance the upper penstock trestle and penstock pipe by painting them a uniform dark color in consultation with the WWNF;

In the vicinity of the Project powerhouse and terminus of the Joseph-Wallowa Lake Highway PacifiCorp proposes to implement the following aesthetic and visual resource measures:

- Replace the fencing surrounding the Project Powerhouse, substation, and yard near the terminus of Joseph-Wallowa Lake Highway;

- Install low-maintenance landscape improvements, (native vegetation, boulders, rock, cobble, and/or gravel) at the Project powerhouse, and the edge of the Joseph-Wallowa Lake Highway terminus;

- Recoat the powerhouse exterior (roof and siding).

2.2.3.9 Cultural Resources

- Implement an unanticipated discovery plan for cultural resources and human remains;

- Conduct archaeological monitoring of any ground disturbing activities associated with construction of the proposed tailrace reroute and major capital recreation improvements. Affected tribes will be given an opportunity to participate in all monitoring;

2.2.4 Modifications to Applicants' Proposal – Mandatory Conditions

Currently, no mandatory conditions have been prescribed by any of the agencies holding conditioning authority.

3.0 ENVIRONMENTAL ANALYSIS

3.1 General Description of the River Basin

The Wallowa River Basin covers a drainage area of 950 square miles (1,530 sq. km) from its headwaters to its confluence with the Grande Ronde River (USGSa). Ninety five percent (907 sq. mi.) of the basin is along the main-stem of the Wallowa River downstream of the confluence of the East and West Forks. The basin is divided into two geographic sub-regions by Wallowa Lake, a lake of 1,508 surface acres (610 ha). The upper basin, where the Project is located, lies south of Wallowa Lake, and is characterized by high steep mountains. The lower basin is characterized by more open gently sloping plains. Most of the precipitation in the basin falls as winter snow.

There are three Project-affected tributaries within the basin. The West Fork Wallowa River is approximately 14 miles long (22.5 km) and has a drainage area of 33 square miles (53 sq. km) ((USGSb). The current Project tailrace enters the West Fork Wallowa River 1.1 miles (1.8 km) above Wallowa Lake. The East Fork Wallowa River is approximately 7 miles (11.3 km) long, with a drainage area of 10 square miles (16 sq. km) including Royal Purple Creek (USGSc). The Project dam and impoundment is on the East Fork Wallowa River 2.25 miles (3.6 km) above Wallowa Lake. Royal Purple Creek is considered a sub-basin of the East Fork and is approximately 2 miles (3.2 km) long. The Royal Purple diversion is located 2.25 miles (3.6 km) above Wallowa Lake.

Per the Projects' State of Oregon water right, up to 15 cfs may be diverted from the East Fork Wallowa River to the Project. A second state water right allows up to one cfs to be diverted from Royal Purple Creek. Combined, up to 16 cfs may be discharged into the West Fork of the Wallowa River by the Project.

Major land uses in the basin including the Project area are federal and private forest, range, and cropland. Primary water uses in the greater Project vicinity include aquatic habitat, irrigation, industrial, and domestic uses.

There is one dam in addition to the two Project diversion dams in the Wallowa River basin. Wallowa Lake Dam is an irrigation dam owned by the *Associated Ditch Companies, Inc.,* of Joseph, OR. This dam is used for irrigation purposes only and has no electric generation facilities. It is located at the outlet of Wallowa Lake, approximately 5 miles downstream of the Project tailrace.

3.2 Cumulative Effects

3.2.1 Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing NEPA (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 reasonable 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 a review of the preliminary license proposal and agency and public comments and FERC staff analysis described in Scoping Document II, PacifiCorp has determined that anadromous fish reintroductions within Wallowa River and Wallowa Lake in the vicinity of the Project is a reasonably foreseeable action that could be affected by the Project. Specifically it is possible that, with modifications to the Wallowa Lake Dam by *Associated Ditch Companies, Inc*. to increase the dam height, ODFW would require anadromous fish passage allowing for re-introduction of sockeye salmon (*O. nerka*) to their native range in Wallowa Lake and its tributaries. No other foreseeable future actions emerged for inclusion in this cumulative effects analysis.

3.2.2 Geographic Scope of Cumulative Analysis

The FERC Scoping Document II identified the Wallowa River (including the Project tailrace and East and West Forks) upstream of Wallowa Lake, Wallowa Lake, and the Wallowa River immediately downstream of Wallowa Lake dam to the southern city limits of the town of Joseph, Oregon as the geographic scope of analysis for anadromous fish reintroductions.

FERC chose this geographic scope because Project operations may affect the success of potential anadromous fish reintroduction efforts within this reach.

The Wallowa Falls Project has cumulatively affected fishery and wildlife resources in the East Fork Wallowa River since the Project diversion dam was constructed in 1921.

3.2.3 Temporal Scope

Based on the potential term of a new license, the temporal scope is 30-50 years into the future, concentrating on the effect to the resources from reasonably foreseeable future actions.

3.3 Proposed Action and Action Alternatives

3.3.1 Geology, Sediment and Substrate

This section describes existing conditions in the Project Area related to geology, soils, sediment and substrate. This includes existing conditions and how those conditions are affected by existing Project facilities and operations. The descriptions in this section provide the baseline by which the Proposed Action is assessed.

Affected Environment

The Project is located on the East Fork Wallowa River, which originates in the Eagle Cap Wilderness on the northern flank of the Wallowa Mountains of eastern Oregon. The Wallowa Falls Hydroelectric Project diverts up to 15 cfs of water from the East Fork Wallowa River (and 1 cfs from Royal Purple Creek) for power generation. Stream flows not diverted for power generation are passed through or over the Wallowa Falls diversion dam into the East Fork Wallowa River. The portion of the East Fork below the dam is referred to as the "bypassed reach". The East Fork Wallowa River flows into the West Fork Wallowa River approximately 1.75 miles (2,800 m) below the Wallowa Falls dam, which then flows into Wallowa Lake approximately 2.25 miles (3,621 m below the dam).

The Upper Wallowa River watershed is predominantly undeveloped forest lands, with a mix of residential development and small industry, mostly mining, livestock grazing and other agricultural uses. The watershed is typified by its location within the Wallowa Mountains. The topography of the area is steep, and includes narrow mountain valleys below rugged mountain peaks. Valley floors and lower slopes are predominately forested, with upper slopes characterized by ridges, rock outcrops and talus slopes.

The bypassed portion of the East Fork Wallowa River is characterized by steep rocky slopes that constrain the channel in a narrow v-shaped valley. The upper portion of the bypassed

reach located from the diversion dam to approximately one mile (1,609 m) downstream is high gradient (19 percent) and characterized by numerous vertical waterfalls and cascades; substrate is dominated by bedrock and boulders. Downstream from this reach, to the confluence of the West Fork Wallowa River, the bypassed reach is characterized by a gentler gradient (8.5 percent) and numerous riffles and pools (PacifiCorp 2011a). A natural waterfall located approximately .9 miles (1,563 m) below the diversion dam presents a complete barrier to upstream migrating fish. The hydrology of the East Fork Wallowa River is discussed in Section 3.3.2 of this document.

To determine baseline conditions and potential impacts of the Proposed Action, PacifiCorp, Cornforth Consultants and Watershed Geodynamics completed several studies and analyses in 2012 and 2013 designed to characterize geology and potential geologic hazards in the Project area and assess sediment quality and substrate characteristics in the Project forebay and bypassed reach of the East Fork Wallowa River. The results of the geologic assessment are contained in the Wallowa Falls Hydroelectric Project: Geology and Soils Updated Study Report (PacifiCorp 2013a). The results of sediment and substrate characterization studies are contained in the Updated Study Report (Final Technical Report) – Wallowa Hydroelectric Project Sediment and Substrate Characterization provided to relicensing stakeholders in January, 2014, (PacifiCorp 2013b). The following presents a brief summary of baseline conditions within the Project area.

Sediment and Substrate

To determine baseline conditions and potential impacts of regular flushing of sediment from the Project forebay into the bypassed reach, PacifiCorp completed studies in 2012 and 2013 to assess sediment quality and substrate characteristics in the Project forebay and bypassed reach.

Forebay Sediment

On August 13, 2012 sediment sampling and a bathymetric survey was conducted in the forebay to characterize and estimate the volume of material likely to be mobilized during future forebay flushing. The forebay was drained prior to the survey conducted by Haner, Ross and Sporseen Engineers. Draining the forebay resulting in inadvertent erosion of some of the sediment deposited in the forebay. A total of 244 cubic yards (223 cubic meters) of sediment were in the forebay at the time of the survey; the surveyor estimated that 560 cubic yards (512 cubic meters) of sediment were in the forebay prior to the drawdown event (an estimated 316 cubic yards (288 cubic meters) were released downstream during the drawdown prior to surveying). Prior to the 2012 survey the forebay was last flushed in 2009.

To characterize sediment in the forebay, samples were collected and analyzed for grain size distribution and metals. Grain size analysis indicated that material in the forebay was composed of primarily fine-grained sediment. Medium sand was the primary sediment type/size present in the forebay during sampling in August 2012, followed by fine sand,

suggesting that the forebay is a depositional area for material ranging in size from gravel to fine sand. Silt and clay size particles were a minor fraction of the material sampled (Table 1 and Figures 2, 3 and 4) (Mason, Bruce and Girard, 2013).

Table 1. Size classifications for sediment samples collected in the Project Forebay, August 14, 2012.

		Percent of total in size class		
Size Categories	**Size Ranges (mm)**	**Unit A**	**Unit B**	**Unit C**
Cobble and larger	> 64	0	0	0
Gravel	2 - 64	14.5	8.6	8.3
Coarse sand	0.5 - 2	18.3	14.1	18.5
Medium Sand	0.25 - 0.5	43.5	20.3	45.1
Fine Sand	0.063 - 0.25	18.9	43.2	17.8
Silt and clay	≤ 0.063	4.8	13.8	10.3

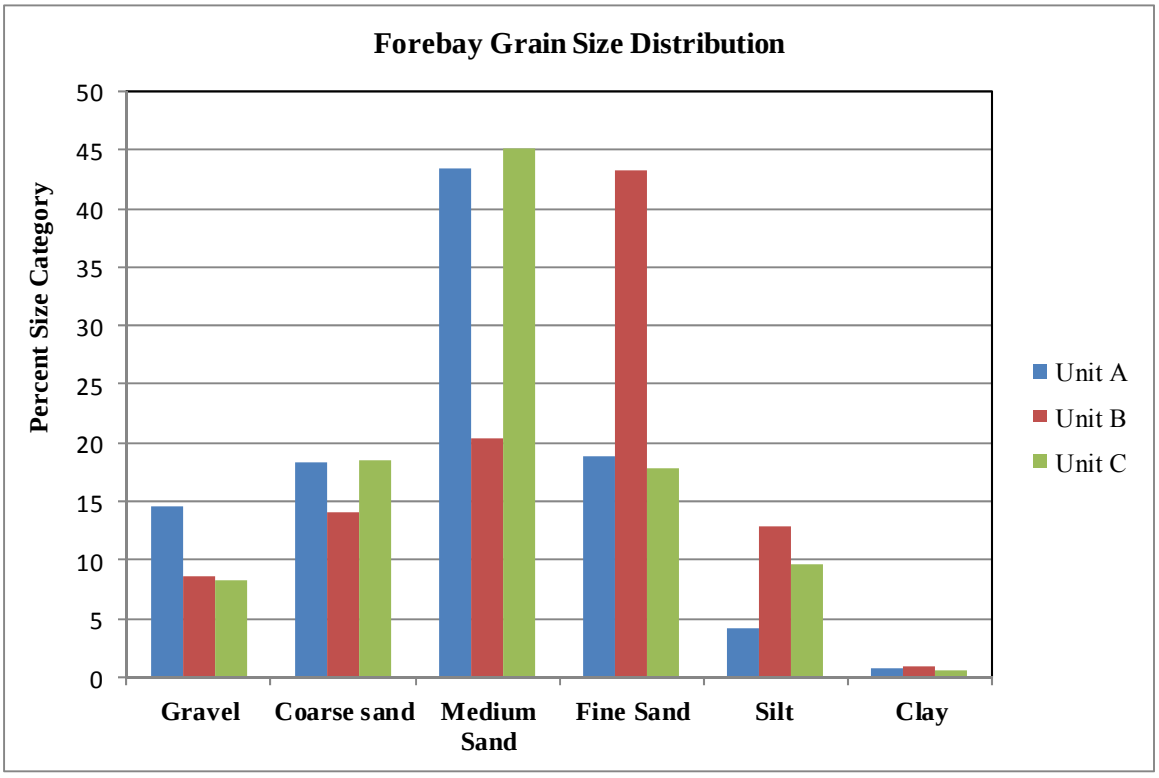


Figure 2. Grain size distribution in the Project forebay, August, 2012.

Forebay sediment samples were analyzed for metals as prescribed in the Sediment Evaluation Framework for the Pacific Northwest (RSET 2006); results are shown below (Table 2). Given the location of the Project forebay in close proximity to the Eagle Cap Wilderness

Area, agricultural and industrial chemical contamination is expected to be negligible, with nutrients derived from natural sources. A mineral resource analysis of the area (Weis et al. 1976) indicates the primary source rock types are granodiorite, limestone, and argillite. There are a few minor mining claims within the watershed; the main potential mining commodities are silver, lead, gold, and copper.

Chromium, copper, and zinc were detected in forebay sediment samples; all other metals were below instrument reporting limits (RL). Detected metals are discussed in more detail below.

Table 2. Metals content in sediment samples collected at Wallowa Falls Hydroelectric Project forebay, August 2012. ND=non-detect, RL=reporting limit; all values mg/kg.

Metal	Sample Result			RL			
	1	2	3		DEQ 2007 Ambient Sediment Levels[1]	DEQ Screening Levels[2]	DEQ/EPA Toxicity Screening JSCS[3]
Antimony	ND	ND	ND	6	0.9	3	64
Arsenic	ND	ND	ND	6	2.8	6	33
Cadmium	ND	ND	ND	2.4	0.16	0.6	5
Chromium	8.1	12	9	2.4	25.1	37	111
Copper	22	38	38	2.4	23	36	149
Lead	ND	ND	ND	6	10	35	128
Selenium	ND	ND	ND	6	None	None	5
Silver	ND	ND	ND	6	0.38	4.5	5
Zinc	38	53	44	12	68	123	459

[1]Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment (DEQ 2007).
[2]Screening Level values in Guidance for Ecological Risk Assessment (DEQ 2001).
[3]McDonald et al., 2000, *in* Portland Harbor Joint Source Control Strategy (DEQ 2005).

A number of reference data sets and screening levels for sediment metals concentrations have been developed and are currently in use by DEQ and the U.S. Environmental Protection Agency (EPA). These include ambient (background) levels of several metals (DEQ 2007), screening values for ecological risk assessment (DEQ 2001). Comparison of Wallowa Falls Forebay sediment metals data to these values indicates that detected metals (chromium, copper, zinc) were well below toxicity screening values reported in Oregon DEQ's JSCS (DEQ 2005), and were near or below published ambient levels (DEQ 2001). The JSCS values can be considered upper level toxicity thresholds (pers. comm. with Jennifer Peterson, DEQ, March 6, 2013). Two of the three copper samples were slightly higher than DEQ's 2001 screening levels for freshwater sediment developed for ecological risk assessment. However for the reasons discussed below, this is likely representative of background copper levels in native material within the watershed.

The Eagle Cap Wilderness is at a northern margin of a belt of metalliferous geologic deposits, with the principal metals being gold, copper, and silver, with minor lead (Weis et al. 1976). There is a history of mining in the Eagle Cap Wilderness, although the specifics about

mining claims in the vicinity of the Project are not very well documented. Copper, molybdenum, tungsten, gold and silver are known to be in the quartz veins and tactite zones of the Wallowa batholith or along its margins (Weis et al. 1976). Copper was identified as the most abundant metal in the Eagle Cap Wilderness with significant concentrations documented in the Aneroid Basin directly upstream of the Wallowa Falls Dam and forebay (Weis et. al. 1976). Based on this information, concentrations of copper detected in sediments collected from the forebay do not represent an ecological risk.

The sediment metals data suggest that metals concentrations in Wallowa Falls Forebay sediments are low and with the exception of copper as discussed above, below screening values set by DEQ and/or EPA. In several cases RLs themselves were higher than screening levels. However, as noted above, given the remoteness of the Project and lack of agricultural and industrial inputs, metals contamination is expected to be negligible, and if present derived from natural sources.

Instream Substrates – Armor Layer

During the week of October 22, 2012, five transect sites within the lower 4,058 ft. (1,237 m) of the bypassed reach were sampled for streambed grain size analysis. These same locations were sampled again on August 14, 2013. In 2013, two sites just upstream of the forebay (Transects 7 and 6) and two sites in the West Fork Wallow River upstream of the Project tailrace (Transects 9 and 8) were also sampled to provide data on substrate size in geomorphically similar areas not affected by forebay flushing. Table 3 provides a summary of transect locations and habitat characteristics.

Surficial substrate was assessed using a Wolman pebble count technique at each sampling location. Particles were collected in a zig-zag line pattern across the stream, utilizing approximately a 30 degree turn angle, extending across the wetted width of the river channel. If 100 particles were not collected in one pass across the channel, the method was repeated going back across the channel in the opposite direction. Particle distance along each transect was one boot length or step apart. The intermediate axis of each particle was measured in millimeters using a transparent metric ruler. For each transect, measured particles were put into size categories and converted to percentages by size class.

Results of 2012 and 2013 substrate sampling are shown in Tables 3 and 4 and Figures 3, 4 and 5. On average over 50 percent of the substrate samples from both 2012 and 2013 were gravel sized material. In 2012, sampled substrate in the bypassed reach ranged from 12 to 38.7 percent sand and finer. In 2013 sand and finer at each bypassed reach sample site was generally less than during 2012 and ranged from 14.8 to 33.9 percent. The percent sand and finer in samples upstream of the forebay ranged from 14.5-21.9 percent, similar to the 2013 sampling in the bypassed reach, suggesting that the level of fines in the bypassed reach is similar to areas not being influenced by forebay flushing.

Table 3. Substrate Sampling Transect Locations and Descriptions.

Transect #	Location	Wetted Width	Average Gradient	Habitat Unit Type
9 (2013)	West Fork Wallowa River: In front of third snag on river left upstream of mess hall.	35 ft (10.7 m)	3%	Cascade over boulder
8 (2013)	West Fork Wallowa River: In front of Boy Scout mess hall.	35 ft. (10.7 m)	3%	Cascade over boulder
7 (2013)	Above Project forebay	19.5 ft. (6.0 m)	3%	Riffle
6 (2013)	Above Project forebay	13.7 ft. (4.2 m)	3%	Pool tailout
5	Above abandoned well house/old staff gage site at abandoned water intake.	14.2 ft. (4.3 meters)	2%	Cascade over boulder
4	At channel split near USFS maintenance yard	12 ft.side channel (3.7 m); 13.4 ft main channel (4.1 m)	2% 3%	Side channel - Riffle Main channel – Cascade over boulder
3	At IFIM Transect 13	15 ft. (4.6 m)	2%	Riffle/glide
2	Approximately 20 meters below road bridge	18.3 ft. (5.6 m)	3%	Riffle
1	Immediately above confluence of the East and West Fork Wallowa Rivers.	13.4 ft. (4.1 m)	3%	Riffle

Table 4. 2012 Substrate Samples Grain Size Distribution

		2012 Percent of total in size class in bypassed reach transects				
Size Categories	**Size Ranges (mm)**	**Transect 5**	**Transect 4[3]**	**Transect 3**	**Transect 2**	**Transect 1**
Sand and Fines	≤2 mm	23.1	36.9	38.7	23.1	12.0
Very fine gravel	2 - 4	1.1	3.7	12.6	4.4	2.8
Fine Gravel	5 - 8	6.3	13	3.6	9.7	9.3
Medium gravel	9 - 16	9.5	5.5	9.9	9.7	20.6
Course gravel	17 - 32	14.7	13.9	8.1	12.4	24.2
Very course gravel	33 - 64	11.6	6.5	10.8	15.0	15.9
Small cobble	65 - 90	10.5	1.9	5.4	6.2	2.8
Medium cobble	91 - 128	10.5	0.9	5.4	3.5	2.8
Large cobble	129 - 180	3.2	4.6	2.7	4.4	2.8
Very large cobble	181 - 255	0	4.6	0.9	3.5	4.7
Small boulder	256 - 512	9.5	1.9	0.9	6.2	1.8
Medium boulder	513 - 1024	0	0	0.9	0	0

Table 5. 2013 Substrate Samples Grain Size Distribution

		2013 Percent of total in size class in bypassed reach transects				
Size Categories	**Size Ranges (mm)**	**Transect 5**	**Transect 4**	**Transect 3**	**Transect 2**	**Transect 1**
Sand and Fines	≤2 mm	15.4	33.9	18.9	15.5	14.8
Very fine gravel	2 - 4	10.3	6.5	7.1	15.5	7.8
Fine Gravel	5 - 8	12.0	14.5	16.5	16.5	16.5
Medium gravel	9 - 16	6.8	12.1	20.5	16.5	14.8
Course gravel	17 - 32	9.4	14.5	18.1	11.7	18.3
Very course gravel	33 - 64	12.8	8.1	9.4	9.7	12.2
Small cobble	65 - 90	12.8	2.4	1.6	6.8	7.0
Medium cobble	91 - 128	6.0	1.6	2.4	2.9	2.6
Large cobble	129 - 180	2.6	3.2	3.1	2.9	0.9
Very large cobble	181 - 255	7.7	0.8	0.8	1.0	3.5
Small boulder	256 - 512	1.7	1.6	1.6	1.0	1.7
Medium boulder	513 - 1024	0	0	0	0	0

[3] An additional 5.5 percent of the cumulative pebble count at this transect was classified as woody debris, leaves and sticks and 0.9 % was classified as bedrock.

Table 5 (continued). 2013 Substrate Samples Grain Size Distribution

		2013 Percent of total in size class upstream of forebay and in West Fork Wallowa River transects			
Size Categories	**Size Ranges (mm)**	**Transect 6 (upstream of forebay)**	**Transect 7 (upstream of forebay)**	**Transect 8 (West Fork Wallowa)**	**Transect 9 (West Fork Wallowa)**
Sand and Fines	≤2 mm	21.9	14.5	5.5	1.0
Very fine gravel	2 - 4	11.4	1.8	4.0	2.0
Fine Gravel	5 - 8	21.0	20.0	6.3	5.0
Medium gravel	9 - 16	8.6	17.3	12.7	3.0
Course gravel	17 - 32	4.8	10.9	12.7	11.0
Very course gravel	33 - 64	8.6	15.5	11.1	21.0
Small cobble	65 - 90	10.5	2.7	11.1	24.0
Medium cobble	91 - 128	5.7	3.6	6.3	5.0
Large cobble	129 - 180	3.8	8.2	9.5	10.0
Very large cobble	181 - 255	2.9	3.6	7.1	6.0
Small boulder	256 - 512	1.0	1.8	5.6	10.0
Medium boulder	513 - 1024	0	0	1.6	0

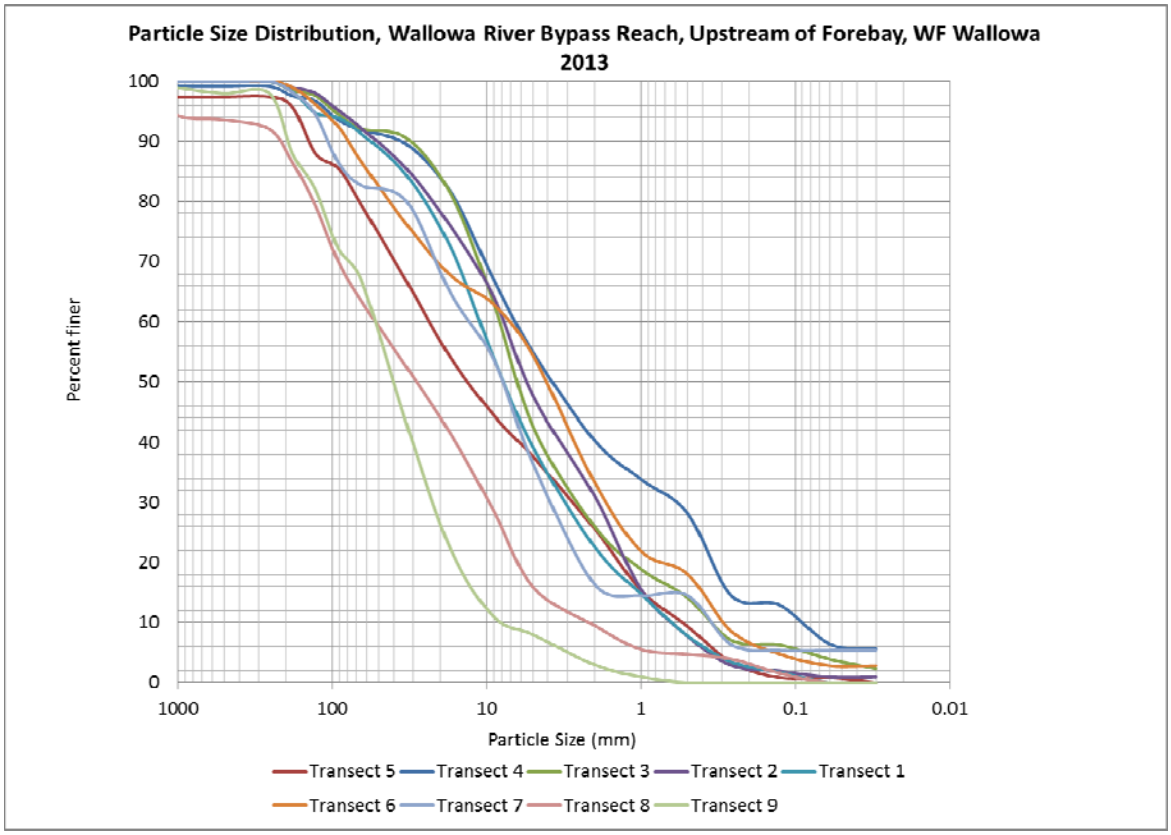


Figure 3. Sediment Percent Finer, 2012 and 2013 Substrate Samples.

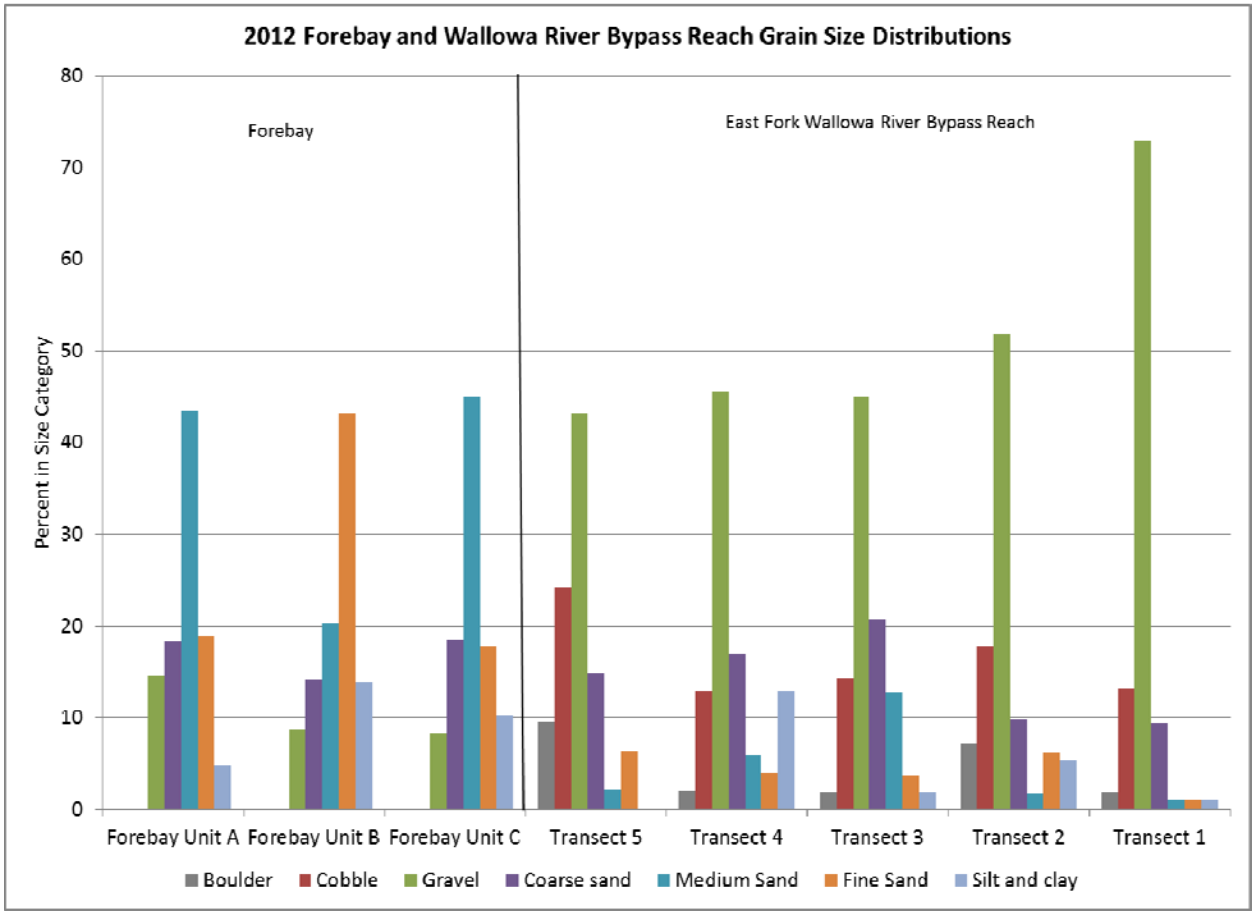


Figure 4. 2012 Project forebay and East Fork Wallowa River substrate particle size distributions (cumulative percent per size class)

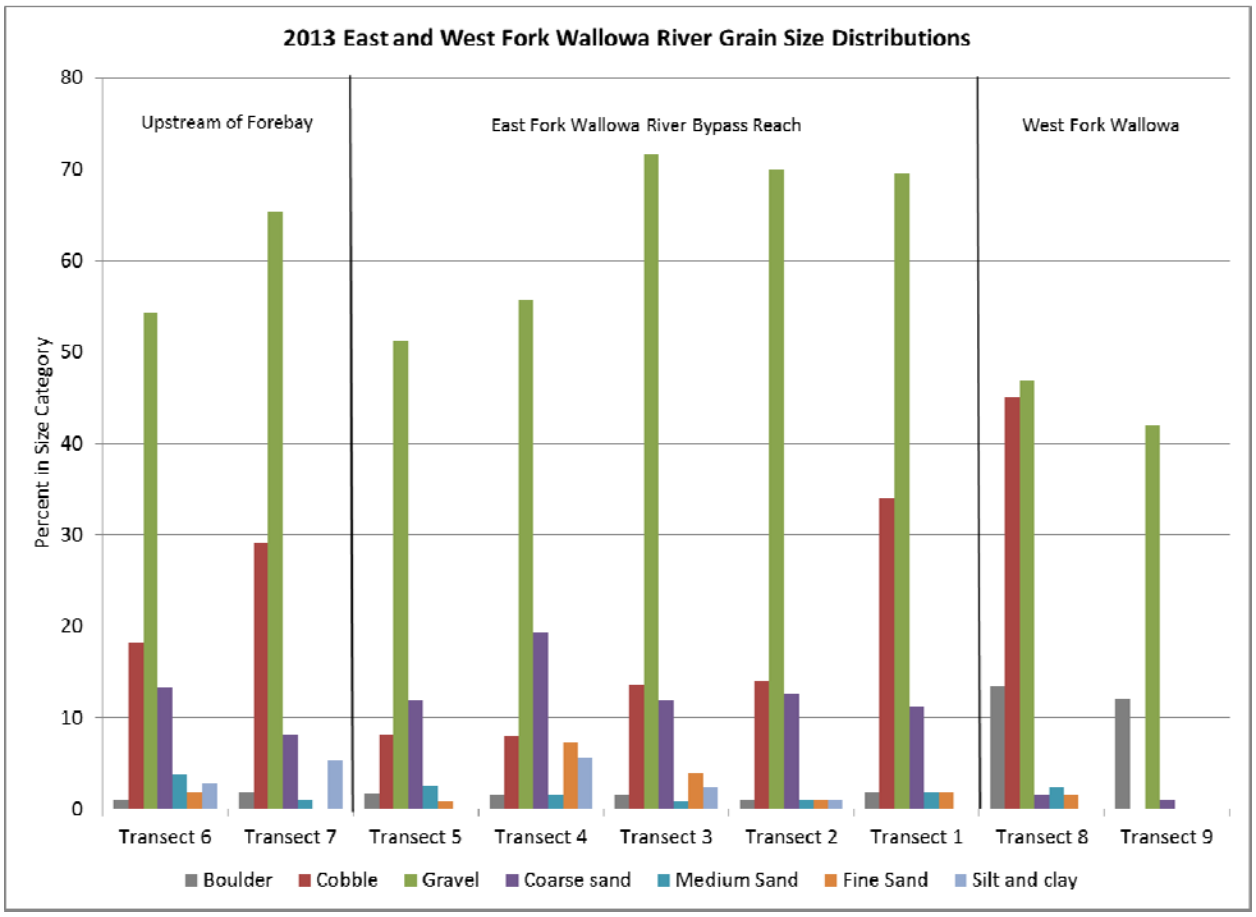


Figure 5. 2013 East Fork and West Fork Wallowa River substrate particle size distributions (cumulative percent per size class)

Instream Substrates – Sub-Armor Layer

Quantitative sampling of the sub-armor layer (sediment below the coarse surface armor layer) was also conducted at three of the transect sites in 2012. Sub-armor sample locations were selected to be representative of the upper, middle and lower portions of the lower gradient 4,058 ft. (1237m) of the bypassed reach. Quantitative sample locations were selected outside of the wetted width but within the ordinary high water mark (OHWM) of the river. Sub-armor layer samples contained primarily gravel-sized sediment (Table 6, Figures 6 and 7). (PacifiCorp 2013b).

Table 6. 2012 Sub-surface Samples Grain Size Distribution

		2012 Percent of total in size class		
Size Categories	**Size Ranges (mm)**	**Transect 2**	**Transect 3**	**Transect 4**
Sand and Fines	≤2 mm	8.1	44.2	24.6
Very fine gravel	2 - 4	8.1	8.9	10.5
Fine Gravel	5 - 8	10.1	11.8	11.8

		2012 Percent of total in size class		
Size Categories	**Size Ranges (mm)**	**Transect 2**	**Transect 3**	**Transect 4**
Medium gravel	9 - 16	30.1	13.5	7.2
Course gravel	17 - 32	3.5	21.6	0
Very course gravel	33 - 64	40.1	0	45.9
Cobble and larger	≥65	0	0	0

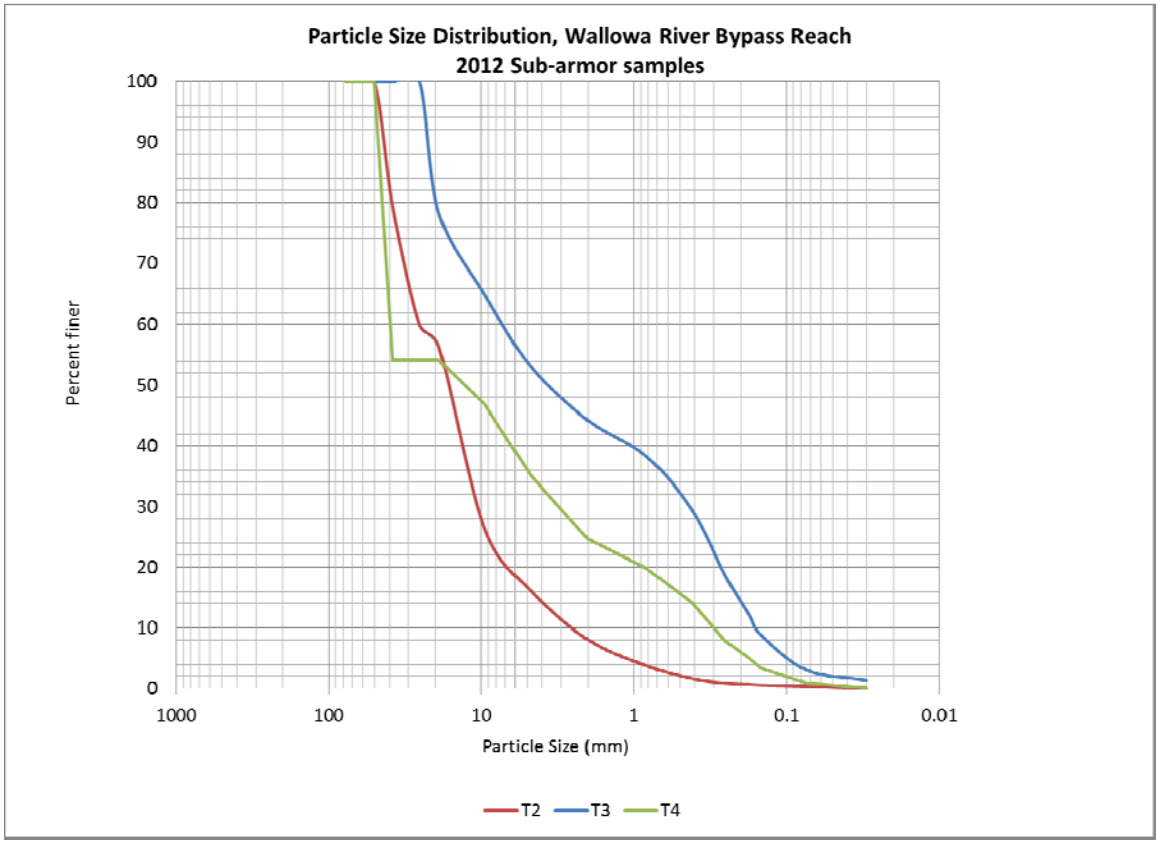


Figure 6. Sediment Percent Finer, 2012 Sub-surface Samples.

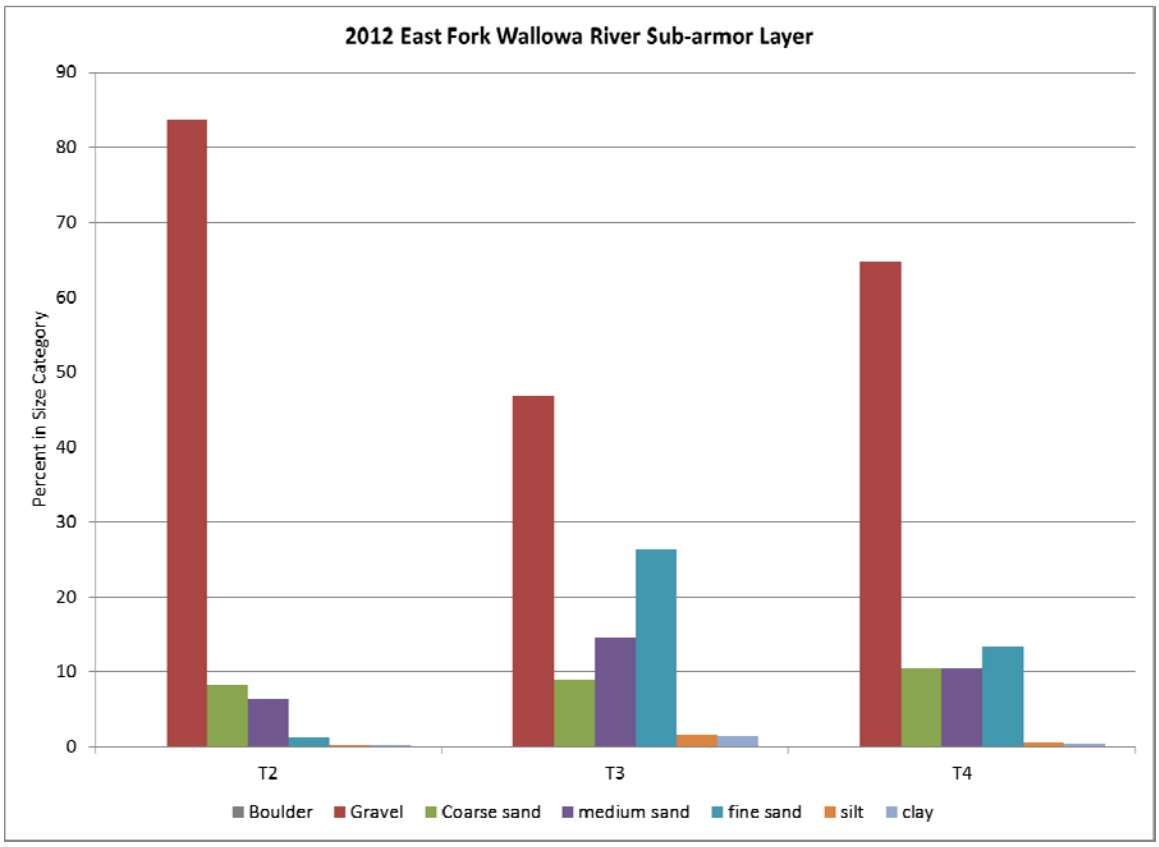


Figure 7. Particle Size Distributions, 2012 Sub-surface Samples.

Geology and Soils

The Project is located on the northern flank of the Wallowa Mountains within the Blue Mountain physiographic providence of northeast Oregon. The dominant rock type observed near the upper (southern) portion of the Project appears to be andesite from the Clover Creek Greenstone formation (Wagner 1955) and basaltic andesite from the Columbia River Basalt Group. The lower (northern) portions of the Project (the powerhouse and tailrace) are dominated by alluvial and glacial deposits. The Project area was formed by extensive glaciation that occurred during the last ice age (Wisconsin Glacial Episode) as recently as 10,000 years ago (Budlong et. al. 2005). The Wallowa Glacier was thought to be at its deepest near the junction of the East Fork and West Fork Wallowa River resulting in very deep glacial deposits in the area around the powerhouse and tailrace. Conversely, the upper Project area is located in a recently scoured area with relatively shallow soils.

The objectives of the geologic assessment were to characterize the existing geology, identify long-term surficial erosion potential in the area, and identify potential geologic hazards that could pose a risk to both the Project facilities (i.e. the penstock and the access road) and the surrounding drainages. The geologic hazards of concern consist of ancient landsides,

historically active landslides, rock falls, and debris flow slides in the steep slopes within the East Fork Wallowa River drainage (PacifiCorp 2013a).

Based on the desktop evaluation, Cornforth Consultants, Inc. concluded that the Project area has no history of large translational landslides, and no signs of ancient landslide terrain or global instability were observed during the site reconnaissance. No historically active deep-seated slumps or rotational slides were observed as well. In addition, the hazards associated with rockfall or instability of the talus piles within the Project area is considered relatively low.

Drainages in areas that have steep mountainous terrain and thin overburden soils overlying shallow bedrock are susceptible to debris flow slides. They typically occur during high intensity rainfall events. These destructive events give little to no warning before they occur. A significant debris flow slide occurred in 2006 on the west slope of the bypassed reach of the East Fork Wallowa River. The debris flow slide caused significant damage to the Forest Service 1804 trail located on the opposite side of the river from the penstock, and the event deposited a significant amount of debris and sediment that temporarily dammed the river and undoubtedly caused major river sedimentation. Based on the steeper slopes and thinner soil and vegetation cover, the western slopes above the East Fork Wallowa River appear more susceptible to debris flows than the eastern slopes; therefore, the penstock and access road are less vulnerable to this type of slide event. However, there is the potential for debris flow slides to occur upstream of the dam that could generate significant quantities of sediment and debris that could cause sedimentation issues at the forebay.

Cornforth Consultants conducted a site reconnaissance effort on September 17-18, 2012. The slopes above the east side of the bypassed reach of the East Fork Wallowa River (where the penstock alignment and access road are located) are comprised of colluvium which consists of silty sand to sandy silt with numerous gravel- to boulder-sized rock fragments. In addition, expansive talus fields associated with the steep to near vertical rock outcrops located at higher elevations to the east were observed. In general, the slope angles on the east side of the river are roughly 32 to 35 degrees, and the slopes are sparsely to moderately vegetated with shrubs and trees. In contrast, the slopes on the west side of the East Fork Wallowa River are relatively less vegetated, have steeper overall inclinations (35 to 45 degrees), and are covered by finer-grained granular soils (scree) and relatively younger talus and rockfall debris. In general, mass wasting appears to be more prevalent and the slopes appear more active on the west side of the river as compared to the east side of the East Fork Wallowa River (where the penstock alignment and access road are located). The slopes immediately around the forebay are relatively flat and well vegetated; however, they steepen considerably over a short distance to the east and west (i.e. outside of the river channel).

Localized areas of minor sloughing associated with cut and side cast construction techniques along the access road were observed during the site reconnaissance. These areas do not pose an immediate risk to the penstock; however, worsening conditions have the potential to cause

localized instability concerns. They will likely continue to be an access road maintenance issue. Localized areas of minor soil erosion associated with the access road were also observed during the site reconnaissance. The amount of sedimentation associated with these localized erosion areas is relatively small and likely on par with what the Forest Service trails contribute throughout the area. However, worsening conditions could lead to increased erosion and sedimentation concerns in the future.

No signs of landslide activity, slope instability, or erosion were observed around the forebay or dam.

There is one problem area along the penstock alignment where there has been significant sloughing along the downslope side of the access road, and the slope between the road and the bypassed reach of the East Fork Wallowa River is failing. This area is located along the access road, approximately 800 feet (245 m) below the diversion dam. At this location the penstock is buried beneath the access road and is at risk of being exposed due to erosion of the access road. PacifiCorp has designed an engineering solution in the form of a mechanically stabilized earth wall, and is currently working with the Wallowa Whitman National Forest and the FERC to complete construction of the repair. The slope stabilization Project will be completed within the term of the current FERC license and does not constitute a proposed facility or environmental measure under this license application.

3.3.1.1 Environmental Effects

This section describes the effects of PacifiCorp's proposed facilities, operations and environmental measures (as described in Section 2.2) on geology, soils, sediment and substrate within the Project Area. The discussion of effects in this section is divided under subheadings associated with the specific proposed facilities, operations, and environmental measures as they pertain to geology and soils or sediment and substrate conditions.

Effects of Construction and Operation of Proposed Project Facilities and Implementation of Associated Best Management Practices (BMPs)

As described in Section 2.2.1, the proposed rerouted Project tailrace facilities would include construction of a new intake structure near the existing powerhouse tailrace, a new buried conveyance pipeline (consisting of a 30-inch (76.2 cm) diameter, 1,000-foot (305 m) long pipe), and a reinforced concrete outfall structure that would discharge powerhouse flows back to the East Fork Wallowa River. As described in Section 2.2.3, PacifiCorp would implement a number of BMPs for erosion, sediment, and spill prevention and control during proposed construction activities. BMPs would be determined in consultation with and approved by applicable regulatory agencies, such as DEQ (related to applicable 401 Water Quality Certification) and the U.S. Army Corps of Engineers and Oregon Department of State Lands (DSL) (related to applicable Section 404 and DSL Removal-Fill Permits).

Sediment and Substrate

The construction and operation of the proposed rerouted tailrace pipe would have direct effects on sediment and substrate conditions in the Project area. There would be short-term construction related impacts associated with the temporary placement of a cofferdam and excavation and disturbance of stream channel substrate in the localized area of the pipe outfall. The installation of a cofferdam would allow for all excavation and material placement below the ordinary high water mark of the river to be isolated and completed in the dry. A cofferdam would be constructed with non-fine containing material and all material will be brought onsite and removed from the river for offsite disposal or reuse post construction[4]. Isolation of active work behind a cofferdam will prevent sediment transport or water quality impacts during outfall construction. If dewatering of the work area behind the cofferdam is necessary, water will be pumped to unsaturated upland vegetated areas for infiltration. Infiltration areas will be monitored daily by a qualified Erosion and Sediment Control Inspector to ensure that all discharged water is infiltrating and there is no erosion, surface or subsurface runoff occurring. If an area becomes saturated an alternative discharge area will be located.

Shoreline stabilization and placement of rip-rap in the area of the outfall would have long-term effects of altering local substrate conditions. The proposed location of the pipeline outlet structure is on the west bank of an existing low gradient side channel to the west of the main channel of the East Fork Wallowa River. The current side channel has an approximate gradient of two percent with small substrate size categories ranging from silt/clay to course gravel and a fair amount of small downed wood and organic material. The proposed tailrace pipeline outfall structure would discharge into a newly constructed energy dissipation channel (15-20 feet (4.6 to 6 m) long) consisting of boulders, logs and/or woody debris to reduce erosion and scour in the East Fork Wallowa River side-channel and main channel habitats. Small areas of cobble, gravel or sand on the perimeter or within the side-channel habitat may be replaced with larger riprap material or concrete for the tailrace pipe outfall structure and energy dissipation channel. Placed riprap is anticipated to have a maximum size of 12-inches, but the final size and details will be determined during final design. There will be no excavation of substrate or placement of material in the main channel of the bypassed reach associated with the tailrace reroute pipe. The introduction of generation flows into the side channel habitat would likely have the short-term effect of localized erosion and scour through the side channel and at the confluence of the side channel and the main channel of the East Fork Wallowa River. To help mitigate any short-term effects and prevent long term effects, the outlet structure would include rip rap (12-inch maximum size) and/or concrete headwalls to prevent shoreline sloughing and erosion and an armored energy dissipation channel to reduce water velocity and potential erosion, scour and sediment transport in the receiving side-channel and main-channel of the bypassed reach of the East Fork Wallowa

[4] Cofferdam will be either an impermeable water filled bladder or constructed of stacked sandbags covered with a visqueen barrier. All cofferdam material will be removed from the river post construction.

River. To further reduce potential scour and sediment mobilization associated with transferring the generation flows to the bypassed reach via the tailrace reroute pipe, water will not be passed through the pipe until the first seasonal high-flow period (June) following construction completion. Although these impacts are unavoidable, due to the small area of impact, they are not expected to adversely impact overall substrate conditions within the bypassed reach.

After the tailrace reroute pipe is put into operation, there will be no Project operational need for the existing tailrace channels that carry water through Pacific Park to the West Fork Wallowa River. The main tailrace channel will be retained, unmodified, as a park feature to provide both drainage and aesthetic benefits. The existing braided tailrace side channels on the north side of the park road will be reclaimed and restored to match surrounding contours. Restoration of these side channels will include filling the channel with clean soils, final grading to direct storm-water runoff away from the park road and into the undeveloped vegetated area to the north, and planting with native seed and plants. Data collection has not indicated fish or amphibian use of the current side channels. Although fish and amphibian use is certainly possible, it is likely not significant. Therefore, substrate condition within the side channels has not been formally assessed. It is not expected that removal of these channels would have a significant impact on aquatic habitat or species within the Project area. Furthermore, restoration of the existing tailrace side channels is expected to reduce erosion and sediment transport (via the existing channel) to the West Fork Wallowa River.

The construction and operation of a tailrace discharge into the East Fork Wallowa River could have direct effects on chemical contamination within the bypassed reach. Construction of the pipe and outfall would involve heavy equipment use, excavation, concrete placement and rip-rap placement immediately adjacent to or below the ordinary high water mark of the East Fork Wallowa River. There is a negligible possibility of chemical contamination from the operation of construction equipment near or over the water during construction of the pipe outfall. The contractor would adhere to the Project's erosion and sediment control plans, best management practices for equipment operation, fueling and maintenance and all applicable Project permits to minimize the risk of a petroleum or chemical discharge to the bypassed reach. Construction-related effects associated with the tailrace reroute would be minor and temporary. After pipe construction an accidental release of oil or lubricants from the Wallowa Falls Hydroelectric plant would potentially be discharged into the bypassed reach of the East Fork Wallowa River via the tailrace pipe. To mitigate this risk, PacifiCorp maintains a Spill Prevention Control and Countermeasure Plan for the plant, and all containers or equipment with a volume of greater than or equal to fifty-five gallons are stored in adequate secondary containment. Spill prevention and response materials are also stored onsite.

Water quality impacts in the form of short-term increases in total suspended solids and turbidity can be expected within the bypassed reach of the East Fork Wallowa River below

the tailrace pipeline outfall. These impacts are discussed in the Section 3.3.2, Water Resources.

Geology and Soils

Construction of the proposed rerouted tailrace facilities would require significant excavation and fill placement for the installation of the buried pipeline and tailrace intake and outfall structures. The final engineering design for the tailrace facilities would incorporate the results of a geotechnical investigation by a professional geotechnical engineer. Construction of the buried pipeline would require excavation of a pipeline trench between the existing powerhouse and bypassed reach of the East Fork Wallowa River. An erosion and sediment control plan would be prepared and implemented during construction. Following construction, the pipeline alignment would be reclaimed by mounding excavated soils over the pipeline, providing stormwater drainage pathways, revegetating all disturbed soil with native seed and plants and distributing habitat logs and woody debris on the local landscape. Priority will be given to native species that are locally adapted for revegetation.

Construction of the tailrace intake structure would include the excavation, placement and backfill for a precast concrete collection basin located at the edge of the existing concrete apron below the powerhouse discharge. The main channel of the current tailrace that runs through Pacific Park on the south side of the park road will be retained as a park drainage feature, but would not be used for Project operation. The braided tailrace side channels on the north side of the park road would be reclaimed and restored to match surrounding contours. Restoration of these side channels would include filling the channel with clean soils, final grading to direct storm-water runoff away from the park road and into the undeveloped vegetated area to the north, and planting with native seed and plants. Restoration of the existing tailrace side channels is expected to reduce erosion and sediment transport (via the existing channel) to the West Fork Wallowa River.

As discussed under *Sediment and Substrate* above, the tailrace pipeline would daylight on the west bank of a low gradient side channel to the west of the main channel of the East Fork Wallowa River. Conceptually, the pipeline outlet structure would be a reinforced concrete structure that would include a drop structure and velocity barrier to prevent all fish species and life stages from entering the pipeline. The outlet structure would include rip rap and/or concrete headwalls to prevent shoreline sloughing and erosion and an armored energy dissipation channel to reduce water velocity and potential erosion, scour and sediment transport in the receiving side-channel and main-channel of the bypassed reach of the East Fork Wallowa River.

The tailrace reroute pipeline project is currently at a conceptual design stage, so it is not possible to develop specific best management practices in as much as they are informed by site conditions, construction materials, schedule or methods. A full suite of best management practices, including an Erosion and Sediment Control Plan, would be included in the final

project design and will be employed to mitigate any short term erosion impacts during all above described construction. Although there would be short-term direct effects to soils in the construction area, long-term geologic effects associated with the rerouted tailrace pipeline are not expected.

As previously identified, the final design package for the tailrace reroute pipeline would include a comprehensive ESCP to control potential erosion and stormwater runoff from disturbed areas during construction. A qualified Erosion and Sediment Control Inspector[5] will be assigned to the Project. The proposed pipeline alignment cuts through a forested area with an intact herbaceous ground cover layer typical to the area. Vegetation is the most effective means of stabilizing soils and controlling erosion (DEQ, 2013). Intact vegetated buffers on both sides of the proposed pipeline excavation will slow any potential stormwater runoff, promote infiltration and sediment deposition. To prevent stormwater/construction water runoff and the transfer of sediment into adjacent waterways during project construction, erosion control BMPs will include, but not be limited to:

Prior to Construction:

- 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 state highway;
- 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 for onsite water disposal: Site(s) will be utilized for infiltration of construction dewatering water (This would be turbid water pumped from pipeline excavation or behind in-water cofferdam. Water will have no other contamination); and
- Hold a pre-construction meeting with contractor team and Erosion and Sediment Control Inspector to review project schedule, installation and maintenance of erosion and sediment control BMPs, project inspection and corrective action protocols.

During Construction:

- Stockpile extra straw waddles and silt fence onsite;
- Regularly inspect all erosion control BMPs and modify as necessary;
- Stabilize exposed soils not being actively worked;

[5] Certified Professional in Erosion and Sediment Control (CPESC); or Washington Department of Ecology's Certified Erosion and Sediment Control Lead (CESCL); or acceptable training or qualified experience as specified in Oregon's 1200-C General National Pollutant Discharge Elimination Permit.

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

Final Stabilization:

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

Effects of Proposed Sediment Management Program for Forebay Maintenance Flushing

As described in Section 2.2.2, it is necessary to flush accumulated native sediment from the Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. Under the proposed sediment management program, PacifiCorp proposes to cease the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period in favor of flushing sediment from the forebay during spring runoff in the month of June. Annual forebay flushing would result in the removal of approximately 250 to 500 cubic yards of accumulated sediment from the forebay and the mobilization and transport of that sediment into the East Fork bypassed reach.

Sediment and Substrate

Based on the type of work proposed and the existing site conditions, the action area for the forebay flushing includes the in-water forebay flushing area and outfall, as well as the East Fork Wallowa River to the confluence with the West Fork Wallowa River, and the mainstem Wallowa River channel downstream to Wallowa Lake (approximately 2.25 river miles (3,621 m) downstream from the action site). This area is expected to encompass all reasonably foreseeable impacts from proposed forebay flushing activities within the river's active channel, including the likely occurrence of temporary downstream turbidity (see Section 3.3.2, Water Resources for further discussion) and sediment redistribution (Mason, Bruce and Girard 2013). The downstream extent of the action area is based on sediment and substrate sampling data collected in 2012 and 2013, the type of work proposed, the length and gradient of the river, the amount of sediment accumulation within the forebay and the timing of flushing.

PacifiCorp proposes flushing 250 to 500 cubic yards in an annual sediment flushing event lasting 24 to 72 hours. Flushing would occur in early June to coincide with the onset of annual high flows within the East Fork Wallowa River. The average mean monthly flow in

the bypassed reach during the month of June is 61 cfs (PacifiCorp 2011a). Flushing as early in the peak flow period as possible would minimize sediment deposition by allowing as much sediment as possible to initially move downstream. Subsequent peak flows would further distribute sediment and minimize deposition throughout the bypassed reach.

Results of the sediment sampling in the Project forebay, and armor layer substrate sampling (pebble counts) and sub-armor layer substrate sampling in the bypassed reach are presented in Section 3.3.1.

The 2012 pebble counts were completed in October 2012 after the Project forebay was drained for surveying in August of 2012. During the draining of the forebay approximately 316 cubic yards of sediment was unintentionally evacuated from the forebay through the low level outlet pipe. The 2012 Pebble count data reflects streambed surface conditions after this sediment input to the bypassed reach. Pebble count data collected in August 2013 represent conditions one year after the sediment release. On average over 50 percent of the substrate samples from both 2012 and 2013 were gravel sized material. The amount of fine-grained sediment (sand, silt, clay) in the bypassed reach is of particular concern, in as much as it may be affected by planned forebay flushing events. In 2012, sampled substrate in the bypassed reach ranged from 12 to 38.7 percent sand and finer. In 2013 sand and finer at each bypassed reach sample site was generally less than during 2012 and ranged from 14.8 to 33.9 percent. The percent sand and finer in samples upstream of the forebay ranged from 14.5-21.9 percent, similar to the 2013 sampling in the bypassed reach, suggesting that the level of fines in the bypassed reach is similar to areas not being influenced by forebay flushing.

To meet a functioning appropriately characterization for bull trout, sediment fines (0.85 mm particle size) should comprise 12 percent or less of surface sediments; between 12 and 17 percent is considered functioning at risk, and greater than 17 percent functioning at Unacceptable Risk (USFWS 1998a). Percent fines at Transect 1 at the lower end of the East Fork Wallowa River bypassed reach, above the West Fork Wallowa River confluence were 10 percent in both 2102 and 2013. Percent fines at all transects averaged 26 percent in 2012, and 16 percent in 2013. Results upstream of the Project forebay at Transects 6 and 7, unaffected by forebay flushing, were 20 percent and 15 percent, respectively. Again, the similar percentage of fines at Transects 6 and 7 and in the bypassed reach in 2013 further supports the theory that the level of fines in the bypassed reach is similar to areas not being influenced by forebay flushing.

No section of the Wallowa River or East Fork Wallowa River above Wallowa Lake is on the Oregon 303(d) list of impaired water bodies (PacifiCorp 2011). The Upper Wallowa River watershed originates in the Eagle Cap Wilderness in the Wallowa Mountains. As such, there are no known sources of anthropogenic pollutants within or above the action area. As discussed above, PacifiCorp collected sediment samples within the Project forebay in August 2012, and analyzed them for a suite of metals. Detectable metals (Cr, Cu, Zn), were well below DEQ's toxicity threshold established jointly with EPA in connection with the Joint

Source Control Program for management of Portland Harbor sediments (DEQ 2005). Two of the sediment copper values were slightly above ecological risk assessment screening values established by DEQ for freshwater sediment (DEQ 2007). These results are not deemed significant from the standpoint of effects to aquatic resources, and are likely a result of high background levels of copper. As noted in Section 3.3.1 mineral resource analysis of the area identifies copper as the most abundant metal in the Eagle Cap Wilderness Area, with elevated concentrations documented in the Aneroid Basin directly upstream of the Wallowa Falls Dam and forebay (Weis et. al., 1976). Concentrations of copper detected in sediments collected from the forebay do not appear to be elevated above natural background levels, nor do they represent an ecological risk. Annual forebay flushing is expected to have no effect on chemical contamination within the action area.

The East Fork Wallowa River is a step-pool, cobble/boulder bedded stream. In streams such as these, flow hydraulics and sediment transport calculations are extremely complex. There are areas of high velocity in deeper, unobstructed portions of the channel where sediment is easily transported and eddies/areas of low velocity behind obstructions such as boulders or large woody debris and along channel margins where sediment can accumulate. In order to determine actual flows necessary to move sand through all areas/eddies/obstructions in the bypassed reach, a two-dimensional model would be needed. There are some areas in the channel (e.g., behind obstructions/along shallow margins) where sand-sized particles will accumulate no matter how high the flow.

Data available for an analysis of sand-sized particle transport in the bypassed reach includes 14 instream flow cross sections located in the lower bypassed reach, from the confluence with the East Fork Wallowa River to approximately 1,500 feet upstream of the confluence.

The Sediment and Substrate Characterization Report (PacifiCorp, 2013b) included an analysis of shear stress and flows necessary to transport given particle sizes. As part of relicensing efforts, PHABSIM transects were surveyed and hydraulic data was collected at fourteen locations in the lower bypassed reach (up to approximately 1,500 feet (500 m) upstream of the confluence with West Fork). These transects are located within areas of fish use in the lower-gradient area of the bypassed reach; flows that transport sand through these reaches should transport sand through upstream, higher gradient reaches. Data collected at these transects were used to estimate shear stress in the center of the channel at the highest flow measured (15 cfs) and compared to critical shear stress required to move 2mm particles on the stream bed.

Shear stress at 15 cfs flow ranged from 0.3 to 4 pounds/square foot at the deepest point on the transects (water depths ranged from 0.85 to 1.8 ft (0.26 to 0.55 m)). Shear stress to move 2 mm particles is estimated at 0.04 pounds/square foot using Shield's criteria for uniform-size streambeds. Andrews (1983) criteria for mixed-grain-size streambeds was used to estimate shear stress to move 2 mm particles on a bed with a sub-armor D50 grain size of 3.5 mm (T3 sub-armor sample) and 15 mm (T4 sub-armor sample); the required shear stress to

move 2 mm particles ranged from 0.09 to 0.32 pounds/square foot. These calculations suggest that flows of 15 cfs would be able to pick up and transport fines through the thalweg of the channel in the bypassed reach. Less than 2 mm is a conservative size class; between 67-77 percent of the sampled sediment within the forebay was finer than 2 mm; 34-61 percent was finer than 0.63 mm. At higher flows, fines would be able to be picked up across the majority of the channel cross sections; shear stress will always be lowest along shallow channel margins for a given flow, but at 45 cfs (June 50 percent exceedence flow in reach) it is likely that sand and fines would be moved throughout the bypassed reach.

Throughout the history of the hydroelectric project sediment has been routinely flushed past the Wallowa Falls dam in forebay flushing events in low flow conditions during the months of July or August. The proposed sediment management program would change the timing of flushing the seasonal high-flow period, which is particularly important for protecting fish, macroinvertebrates, and aquatic and riparian habitat.

PacifiCorp conducted additional analysis to support development of a minimum flushing flow, i.e., the flow required to mobilize small (<2 mm) particles across the channel, not simply in the thalweg (Dube', 2014). For this analysis basal shear stress (shear stress on the bed of the stream resulting from flow) was calculated for the location of the margin of the 5 cfs channel (e.g., water's edge transect station under measured 5 cfs flow) for flows of 15, 20, 30, 40, 50, and 60 cfs using Manning's equation to estimate flow depth at each transect (Table 7).

Table 7. Calculated Basal Shear Stress (pounds/square foot) for Instream Flow Transects.

	Shear Stress at Margin of 5 cfs Channel (Water's Edge Station at 5 cfs)					
Transect	**Q = 15 cfs**	**Q = 20 cfs**	**Q = 30 cfs**	**Q = 40 cfs**	**Q = 50 cfs**	**Q = 60 cfs**
1	0.24	0.42	0.74	1.00	1.25	1.58
2	0.36	0.49	0.88	1.20	1.46	1.78
3	0.57	0.93	1.52	2.11	2.70	3.29
4	0.74	1.08	1.81	2.53	3.26	3.84
5	0.51	0.92	1.72	2.52	3.09	3.90
6	0.39	0.71	1.12	1.66	2.07	2.43
7	0.07	0.11	0.20	0.30	0.37	0.45
8	0.40	0.87	1.61	2.50	3.24	3.98
9	0.51	0.71	1.55	2.56	3.24	4.08
10	0.72	1.01	1.54	2.06	2.46	2.99
11	0.86	1.05	1.72	2.39	2.90	3.40
12	0.64	1.11	2.07	2.87	3.68	4.64
13	1.18	2.24	5.00	7.49	9.99	12.50
14	0.70	0.93	1.76	2.42	2.76	2.76

The basal shear stress can be compared to the critical shear stress needed to mobilize sand-sized (2 mm) particles. In theory, if basal shear stress is above the critical shear stress, a bed made of 2 mm particles should be mobilized. In reality, the bed of a stream is composed of a mixture of different sized particles that are mobilized at different shear stresses/flows, so

surficial sand may be effectively hiding behind larger particles. Shear stress to move 2 mm particles is estimated to be 0.04 pounds/square foot using Shield's criteria for uniform-size streambeds. Andrews (1983) criteria for mixed-grain-size streambeds was used to estimate shear stress to move 2 mm particles on a bed with a sub-armor D50 grain size of 3.5 mm (T3 sub-armor sample) and 15 mm (T4 sub-armor sample); the required shear stress to move 2 mm particles ranged from 0.09 to 0.32 pounds/square foot.

Based on the estimated basal shear stress at the edge of the low flow (5 cfs) channel station shown in Table 7, sand-sized particles should be able to be entrained from within the mixed grain-size substrate at the majority of the instream flow transects at flows of 15-20 cfs. Transect 7, in a very low gradient location, is the only location analyzed that would require higher flows (50-60 cfs) to mobilize sand from a mixed-size bed.

The flow to keep sand in motion once it is mobilized is much less than the flow to entrain it. Therefore, once sand-sized particles are mobilized, or if flows during the flushing event are high enough to keep sand moving through the system, sand particles could be transported through much of the stream without being deposited.

Based on the results of sediment and substrate monitoring in 2012 and 2013, the limited human activity within the upper watershed, the high gradient of the East Fork Wallowa River and levels of fines in the bypassed reach similar to those in areas not being influenced by forebay flushing, and the proposed timing of flushing during seasonal high flows the annual flushing of the forebay is not expected to adversely affect substrate conditions in the action area. Although, no long-term effects to sediment and substrate within the action area are expected, short-term impacts to water quality in the form of short-term increases in suspended sediments and turbidity within the action area would occur. These effects are discussed in the Section 3.3.2, Water Resources. PacifiCorp would monitor turbidity as described in the Turbidity Monitoring Plan for Maintenance Forebay Flushing included in Appendix D. Potential effects to fish, macroinvertebrates and aquatic and riparian habitat are discussed under Aquatic Resources (in Section 3.3.3) and Terrestrial Resources (in Section 3.3.4).

Geology and Soils

Annual forebay flushing is not expected to have any impacts on geologic conditions or soils within the Project area.

Routine Assessment of Geologic Hazards at the Project for Incorporation into PacifiCorp's Dam Safety Monitoring Plan for the Project

As described in Section 2.2.2, PacifiCorp proposes to incorporate a routine (five-year interval) geologic hazard assessment into the Dam Safety Surveillance and Monitoring Plan (DSSMP) for the Wallowa Falls Project. The assessment would be performed by a qualified

geotechnical and/or engineering geologist to review the condition of known hazards and identify any new hazards that may have developed. The assessment would be submitted to the Division of Dam Safety and Inspections and accompanied by a plan and schedule to address any hazards that represent a tangible threat to Project features and/or public safety.

This assessment would facilitate early detection of real or potential landslide activity, rock fall, slope instability, or excessive erosion. Early detection of these types of conditions would protect Project facilities, public and worker safety, and terrestrial and aquatic habitats.

Regular assessment of geologic hazards within the Project area has the potential to have a direct positive effect on instream substrate conditions within the East Fork Wallowa River. Prevention of significant rockfall or landslide events, which could result in erosion and sediment transport, would reduce sedimentation within the bypassed reach of the East Fork Wallowa River.

Inspection and Maintenance of the Forebay Access Road

As described in Section 2.2.2, PacifiCorp proposes to implement the Access Road Inspection and Maintenance Plan provided in Appendix E. The proposed Plan includes routine inspection and monitoring of the forebay access road, options for erosion control and mitigation, and reporting and documentation.

Sediment and Substrate

Regular inspection and maintenance of the forebay access road will prevent potential erosive events that could transport soils or sediment into the bypassed reach of the East Fork Wallowa River. Therefore implementation of the Access Road Inspection and Maintenance Plan is expected to have either no measurable or positive impacts on sediment and substrate conditions within the Project area.

Geology and Soils

The access road needs to be maintained to allow unimpeded travel to the dam by high-clearance vehicles for the purposes of inspections, maintenance and emergency response. Implementation of the proposed Access Road Inspection and Maintenance Plan would result in a monthly monitoring survey of the access road and a more comprehensive stability analysis by a qualified geotechnical engineer or engineering geologist every five years. This will facilitate early identification of any erosion or road stability issues on the road.

Implementation of the Plan will assure that the access road is maintained, while reducing the likelihood of significant erosive events and thereby minimizing potential soil disturbance, stormwater runoff, and sedimentation that would be associated with such an event.

Relocation of Stream Flow Compliance Point and New Flow Gaging Structure

As described in Section 2.2.2, PacifiCorp proposes to relocate the current Project instream flow point of compliance from its current location immediately downstream of the diversion dam to lower in the bypassed reach just above the migratory fish barrier. This proposal includes the construction of a cast-in place long-throated open flume within the bypassed reach channel to improve stream gaging accuracy.

Sediment and Substrate

The final cast in place long-throated flume would be a trapezoidal structure that covers approximately 500 square feet (46.5 square meters) of the channel. Concrete will replace native substrate in this location. The estimated area of excavation required for the project would be 924 square feet (85.4 square meters), but depth of excavation will depend on material encountered during construction. Work will be done behind a cofferdam to prevent sediment transport, increased turbidity and water contact with uncured concrete during construction. The cofferdam would be constructed with local rocky substrate excavated from the bypassed reach channel. A gated pipe, no larger than 18-inch diameter, will be imbedded in the rockfill to divert up to 20 cfs around the work area for approximately six weeks. A sump catchment basin would be constructed at the downstream end of the in-channel work areas to capture any sediment or detritus. All water and sediment captured in the sump would be pumped to an upland vegetated area for infiltration. Local substrate used for cofferdam construction will be re-dispersed within the local bypassed reach area at the end of construction.

The installation of a concrete flume gaging structure would replace and therefore adversely affect local substrate conditions in 500 square feet (46.5 square meters) bypassed reach upstream of the migratory fish barrier. However, given the small area of impact, the proposed gaging structure is not expected to adversely affect substrate conditions in the overall Project area.

Geology and Soils

Access to the proposed flow gaging structure location would be via the existing maintenance road and all construction staging would be within the previously disturbed area of the maintenance road and PacifiCorp bridge over the bypassed reach. Any upland areas used for construction dewatering will be monitored daily to ensure that infiltration is occurring and there is no surface or subsurface runoff occurring. If runoff is observed an alternative upland infiltration area will be located.

The relocation of the point of compliance for instream flows and the construction of a new stream gaging structure is not expected to have a measurable impact on geology or soil conditions within the Project area.

3.3.2 Water Resources

This section describes the existing conditions in the Project area related to hydrology and water quality. This includes hydrology and water quality conditions that currently exist and how these conditions are affected by existing Project facilities and operations. The descriptions in this section serve as the baseline against which the effects on hydrology and water quality of proposed Project facilities and operations are assessed (in Section 3.3.2.1 below).

Affected Environment

Hydrologic Conditions in the Project Area

The East Fork and West Fork of the Wallowa River, along which the Project facilities are located, are relatively pristine streams that originate in the Eagle Cap Wilderness Area in the Wallowa Mountains. The East Fork and West Fork join about 0.5 miles below the Project powerhouse tailrace, and the Wallowa River continues to flow north about 0.6 miles into Wallowa Lake. The East Fork and West Fork of the Wallowa River are snowmelt runoff streams. Peak runoff occurs in late spring to early summer, generally from May through mid-July, from melting snowpack. By late July, little of the snow is left in the Wallowa Mountains. Runoff recedes to low flows by late summer, usually August and September. Flows can again increase in fall in response to autumn rains, but lower flows generally persist from late fall through winter due to freezing conditions in the contributing high-elevation watershed areas, which result in little or no direct runoff during this time.

PacifiCorp collected flow data at five sites in the Project vicinity during Water Year (WY) 2012 (i.e., October 2011 through September 2012) and WY 2013 (i.e., October 2012 through September 2013), including the East Fork inflow to the Project forebay (site EFI), the Royal Purple Creek inflow to the Project diversion (site RPI), the upper end of the East Fork bypassed reach just below the Project diversion (site BPU), the lower end of the East Fork bypassed reach (site BPL), and the Powerhouse tailrace (site PHT).

The flow data at the gage sites was used to compute average monthly flows and the annual average flow for WY 2012 and WY 2013 at the gage sites (Table 8). The overall average annual flows for WY 2012 at sites EFI, RPI, BPU, BPL, and PHT were 20.8, 1.8, 11.1, 19.5, and 10.5 cfs, respectively (Table 8). The overall average annual flows for WY 2013 at sites EFI, RPI, BPU, BPL, and PHT were 21.2, 1.1, 13.1, 15.7, and 8.1 cfs, respectively (Table 8).

Table 8. Average Monthly Flow (cfs) by Study Site During WY 2012 and WY 2013.

Month	Average Monthly Flow (cfs) by Study Site									
	EFI		RPI		BPU		BPL		PHT	
	WY 2012	WY 2013	WY 2012	WY 2013	WY 2012	WY 2013	WY 2012	WY 2013	WY 2012	WY 2013
October	15.1	18.1	NA	0.9	3.8	12.0	NA	14.8	13.8	4.1
November	14.5	19.7	NA	1.1	1.9	6.7	NA	9.6	13.7	9.6
December	14.4	19.7	NA	1.4	1.7	6.4	21.1	9.3	12.3	9.7
January	12.4	16.1	NA	1.2	6.4	2.7	24.0	4.6	5.3	10.8
February	11.3	13.7	NA	1.0	3.4	1.7	10.8	3.0	8.6	10.6
March	10.7	11.8	NA	0.9	1.4	5.2	6.6	7.3	10.5	6.7
April	16.5	11.7	NA	0.9	5.9	7.4	11.1	8.2	10.7	6.2
May	28.1	26.0	0.8	1.3	17.2	19.3	22.4	21.1	12.6	10.8
June	49.8	44.0	0.9	2.3	36.9	38.8	47.6	43.7	12.8	10.5
July	41.2	31.0	2.0	1.3	33.2	26.6	33.7	32.9	9.6	10.6
August	17.0	19.5	2.1	0.8	11.1	12.9	9.9	14.3	9.0	6.9
September	14.8	22.4	2.1	0.6	9.8	17.4	8.4	17.6	7.6	1.3
Average	20.8	21.2	1.8	1.1	11.1	13.1	19.5	15.7	10.5	8.1

Available flow information for the Project area also includes historic USGS streamflow data from two locations in the Project vicinity over a 44-year period from October 1924 to September 1952 and again from October 1966 through September 1983 (PacifiCorp 2013c)[6]. Based on this previous 44-year period of record, average mean monthly flows in the East Fork ranged from 11 cfs in February and March to 56 cfs in June. During the period of record, monthly flows met or exceeded 14 cfs 90 percent of the time, 21 cfs 50 percent of the time, and 31 cfs 10 percent of the time.

Examination of available snowpack and hydrology data from the surrounding area indicates that the previous 44-year flow data records for the historic USGS gages in the East Fork are representative of current hydrologic conditions; that is, no substantive systematic shift in conditions appears to have occurred since East Fork gage records stopped in 1983 (PacifiCorp 2013c). However, this conclusion is not meant to imply that landscape or climate change effects on hydrology in the area may be occurring now or in the future.

[6] The two locations include USGS gages in the Project tailrace (USGS Station 13324500) and in the East Fork one quarter mile upstream of the confluence with the West Fork (USGS Station 13325000). The summation of data from the two sites constitutes a third "reporting station" (USGS Station 13325001) that represents the overall hydrology of the East Fork in the Project vicinity.

Comparison of average monthly flows for WY 2012 and WY 2013 at the gage sites (Table 8) with the 10, 50, and 90 percent exceedance levels[7] of average monthly flows at the historic USGS gages (Table 9) were used to estimate whether flow conditions were near normal (if comparable to the median or 50-percent historic value), significantly above average or "wet" (if near to the 10-percent historic value), or significantly below average or "dry" (if near to the 90-percent historic value). Such comparisons indicate that average annual inflows to the Project at the EFI site were near historic normals in both WY 2012 and WY 2013. During WY 2012, average monthly inflows to the Project at the EFI site were near historic normals in nearly all months, expect for April that was wet by comparison. During WY 2013, average monthly inflows to the Project at the EFI site were wet by comparison from October through February and then again in September, but then near normal in the other spring and summer months.

Average annual flows further downstream in the East Fork bypassed reach (as measured at site BPL) were wet in WY 2012 and near normal in WY 2013. During WY 2012, average monthly flows at site BPL were normal in the spring and summer months (i.e., May through September), but were wet by comparison in the winter months. In December and January, average monthly flows were higher than any recorded previously at the historic USGS gages for those months. These wet winter conditions were the result of substantial peak flows caused at lower elevations by rain-on-snow events that were recorded at the lower-elevation BPL site during WY 2012. During WY 2013, average monthly flows at site BPL were wet by comparison from October through December, again in March-April, and then again in September, but otherwise near normal in the other winter, spring, and summer months. The rain-on-snow events recorded at site BPL site during WY 2012 were not as evident during WY 2013.

Table 9. Average Monthly Flow (cfs) by Percent Exceedance Levels for Historic USGS Gage in the Project Vicinity.

	Project Tailrace plus East Fork (USGS Station 13325001)			Project Tailrace (USGS Station 13324500)			East Fork (USGS Station 13325000)		
Month	**10%**	**50%**	**90%**	**10%**	**50%**	**90%**	**10%**	**50%**	**90%**
October	19.6	14.8	11.1	13.2	8.7	6.3	9.3	4.9	2.8
November	17.9	14.1	10.6	12.6	8.8	6.5	8.3	4.4	2.1
December	16.5	12.7	10.4	12.1	8.7	5.4	7.0	3.8	1.6
January	14.4	11.6	9.6	11.0	8.3	6.4	6.2	2.8	1.4

[7] The 10 percent exceedance level is the flow level that is equaled or exceeded by 10 percent of the monthly average flow values in the period of record. For example, a 10 percent exceedance level of 15 cfs in February means that, for a 44-year record, 4 of the monthly average flow values for February in the historic record equaled or exceeded 15 cfs and the other 40 values were less than 15 cfs. Likewise, the 90 percent exceedalevel is the flow level that is equaled or exceeded by 90 percent of the monthly average flow values in the period of record. The 50 percent exceedance level is the median of the monthly average flow values in the period of record.

	Project Tailrace plus East Fork (USGS Station 13325001)			Project Tailrace (USGS Station 13324500)			East Fork (USGS Station 13325000)		
Month	**10%**	**50%**	**90%**	**10%**	**50%**	**90%**	**10%**	**50%**	**90%**
February	13.8	11.3	8.9	11.3	8.0	6.3	4.8	2.5	1.0
March	13.3	10.9	8.5	11.0	7.6	5.7	4.8	2.6	0.9
April	17.0	13.6	10.3	10.5	7.7	5.8	9.3	4.7	2.6
May	47.9	27.4	21.0	13.6	8.6	6.5	35.7	18.7	12.2
June	88.3	56.3	38.1	14.8	9.3	6.7	73.9	44.8	27.2
July	73.5	42.7	21.3	14.5	9.2	5.8	66.8	30.7	9.9
August	29.5	20.4	12.9	13.1	9.3	6.6	17.7	8.5	4.1
September	19.6	16.4	11.7	13.9	9.5	6.9	10.7	5.3	2.6
Average	30.9	21.0	14.5	12.6	8.6	6.2	21.2	11.1	5.7

"Baseflow" is the component of streamflow that is attributed to sustained shallow ground water discharge to the stream channel. Baseflow analysis provides insight into low flow conditions in a stream resulting from the gradual recession of discharge during periods with little or no precipitation (Tallaksen 1995).

Hydrograph separation analysis was used to estimate baseflow contributions to the East Fork, including the Project bypassed reach (PacifiCorp 2013c). The average monthly baseflows range from about 10 to 17 cfs at the East Fork inflow to the Project forebay (site EFI) and 12 to 19 cfs at the lower end of the East Fork bypassed reach (site BPL) for months during summer/early fall (August-October) and late fall/winter (November-April) low flow periods. The net average monthly baseflows between sites EFI and BPL (i.e., the difference between estimated baseflows at sites EFI and BPL) range from about 1 to 4 cfs. The net baseflow provides an estimate of the sustained groundwater discharge that occurs to the East Fork in-between the EFI and BPL locations during low flow seasons.

As discussed in Section 1.0, the Project diverts portions of the flow from the East Fork (and lesser diversions from Royal Purple Creek) for use at the Project powerhouse. The minimum hydraulic capacity of the powerhouse is approximately 3 cfs and the maximum hydraulic capacity is 16 cfs. Thus, the total amount of flow diverted to the Project powerhouse generally ranges from 3 to 16 cfs. Historically, the median monthly average amount of flow diverted to the Project powerhouse was 8.6 cfs based on the 44-year period of record at the Project tailrace USGS Station 13324500 (Table 9). During WY 2012, the average annual Powerhouse diversion amount was 10.5 cfs, and during WY 2013 the average annual diversion amount was 8.1 cfs. During WY 2012 and WY 2013, average monthly flows at site PHT, indicative of flow-related powerhouse operations, were relatively uniform at flow levels between about 9 and 14 cfs, with some relatively low average monthly flow occurring when operations included days of powerhouse outages for maintenance purposes (e.g., 1.3

cfs in September 2013).

The current FERC license for the Project requires that flow releases be provided from the East Fork diversion dam to maintain a continuous minimum instream flow in the East Fork bypassed reach. The required minimum instream flow release is 0.5 cfs or the natural inflow to the reservoir, whichever is less, as measured immediately downstream from the diversion dam. However, instream flows in the bypassed reach typically exceed the required minimum instream flow release for three reasons:

- The required minimum flow is released through a fixed pipe at the diversion dam. To insure continuous compliance with the existing minimum flow provision of 0.5 cfs, PacifiCorp typically releases an additional discharge of 0.3 cfs. Accordingly, actual flow released may range between 0.5 and 0.8 cfs largely depending on season.

- Natural baseflow (groundwater) discharge occurs in the bypassed reach. As described above, an estimated baseflow discharge of about 1 to 4 cfs occurs to the East Fork in-between the EFI and BPL locations during low flow seasons. A larger amount of additional runoff in the bypassed reach also occurs seasonally, such as during snowmelt runoff conditions.

- During higher-flow times of the year (e.g., the snowmelt runoff period), flows arriving at the diversion dam from upstream are likely in excess of 16 cfs, which is the maximum hydraulic capacity of the powerhouse. At these times, all flows in excess of 16 cfs remain within the bypassed reach. This can occur in many months, but is particularly prevalent in the higher-flow months of May, June, and July.

Water Quality Conditions in the Project Area

Overall water quality in the Wallowa River watershed is generally excellent, due to the relatively pristine location and physical characteristics of the watershed areas, most of which lies within the Eagle Cap Wilderness Area (Nowak and Kuchenbecker 2004). Because the East Fork and West Fork are supplied by direct snowmelt runoff or groundwater baseflow, they are consistently relatively cold throughout the year.

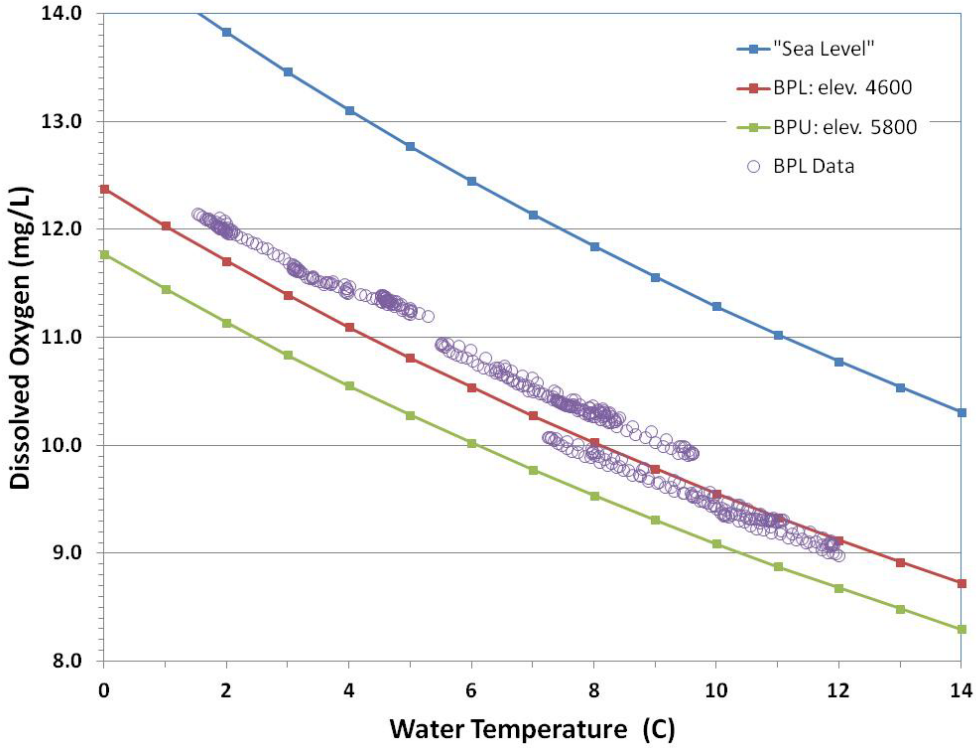
Dissolved Oxygen

PacifiCorp collected dissolved oxygen (DO) data in the East Fork at sites EFI, BPU, and BPL on a continuous hourly basis during multi-day sampling events in August and September 2012. The data indicated that DO was at or near full saturation (100 percent) in all measurements at all sites at concentrations between about 9.0 and 11.5 mg/L. The relatively high elevation of the Project area is an important factor in that full saturation (100 percent) of DO in the water is reached at lower concentrations than would occur at sea level. There is a direct relationship between atmospheric pressure and DO—at higher elevations, where air

pressure decreases relative to sea level, the relative oxygen solubility decreases (Figure 8).

The State of Oregon standard indicates that DO in streams may not be less than 95 percent saturation[8] when trout spawning through fry emergence occurs or less than 90 percent saturation[9] as an absolute minimum (OAR 340-041-0016). As described above, the monitoring data indicate that DO is fully saturated (consistently 98 to 105 percent) in waters of the Project area. As such, the DO values measured at all times during this study meet the State standard's 90 or 95 percent saturation criteria.

Figure 8. The relationships at differing elevation levels of dissolved oxygen concentration and water temperature equal to 100 percent saturation.



Total Dissolved Gas

PacifiCorp collected total dissolved gas (TDG) measurements twice-daily for two-day sampling periods each month from June to September 2012 (PacifiCorp 2013c). The TDG measurements (in percent-saturation) at the powerhouse tailrace site were all at or near 100 percent saturation. These values indicate that TDG supersaturation (i.e., TDG saturation

[8] 95 percent saturation applies where ambient pressure and temperature conditions preclude attainment of the 11.0 mg/l or 9.0 mg/L criteria, which is sometimes the case in the Project area due to elevation effects as discussed in Section 3.3.2.4.

[9] 90 percent saturation applies where ambient pressure and temperature conditions preclude attainment of 8.0 mg/L as an absolute minimum, which was never the case during this study and is not anticipate to occur, but is assumed for the analysis here due to elevation effects as discussed in Section 3.3.2.4.

greater than 110 percent) from potential turbine air entrainment, which can be a problem for aquatic organisms, is not a concern at the Project powerhouse.

The State of Oregon standard indicates that TDG may not exceed 110 percent saturation[10] at the point of sample collection and may not exceed 105 percent saturation in waters less than two feet in depth (OAR 340-041-0031). As such, the TDG values measured at all times during this study at the powerhouse tailrace meet the State standard's 105 or 110 percent saturation criteria.

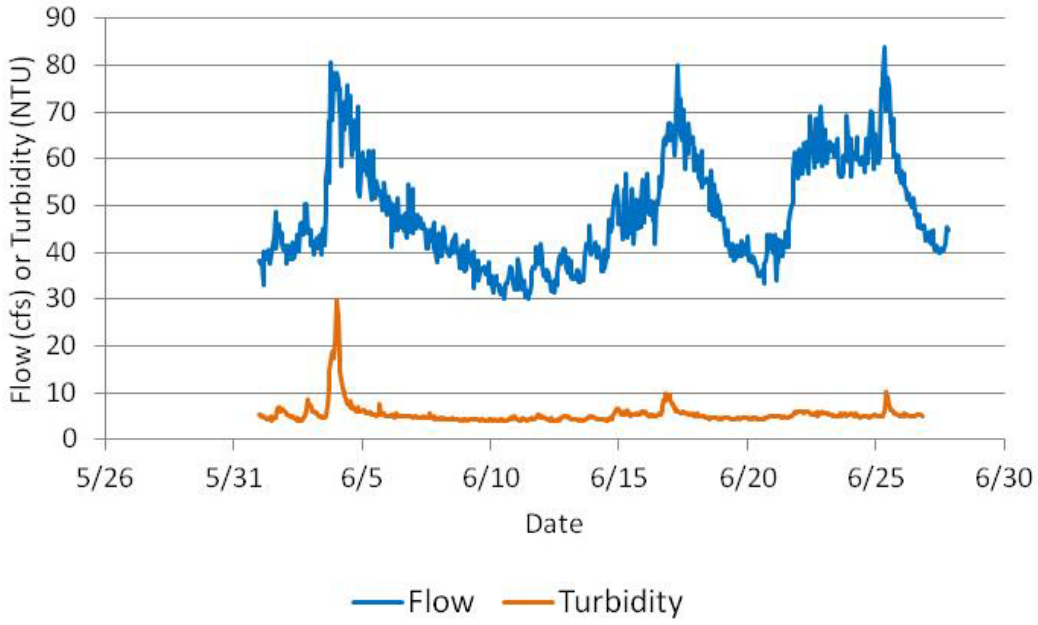
Turbidity

During the course of past Project operations, PacifiCorp has flushed the forebay behind the East Fork diversion dam on an as-needed basis to reduce sediment build-up. The current FERC license restricts forebay flushing to the period of May 1 through August 30 of each year for the protection of kokanee eggs and sac fry in the gravel areas upstream of Wallowa Lake. Such flushing temporarily increases turbidity and suspended fine sediments downstream of the diversion dam.

Turbidity and streamflow monitoring conducted by PacifiCorp during June 2012 in the East Fork bypassed reach illustrate the influence of early season high flows on turbidity and fine sediment transport (PacifiCorp 2013c). The purpose of this monitoring was to develop a record of background turbidity and flow for a typical June runoff period prior to future forebay flushing events. The monitoring data indicate that natural turbidity conditions in the East Fork generally vary in response to streamflow runoff events. For example, during the June 2012 data collection (Figure 9), turbidity peaked to a relatively high level of 30 nephelometric turbidity units (NTU) that occurred over a short duration coincident with the first high-flow runoff event of the spring (often called a "first flush"). Subsequent high-flow events that occurred later in the month were of similar flow magnitude (around 80 cfs) but corresponding turbidity peaks only reached around 10 NTU. Between these peaks, turbidity levels were consistently relatively low (less than 5 NTU).

[10] Except when stream flows exceed the 10-year, 7-day average flood, which was not the case in this study.

Figure 9. Continuous turbidity and flow monitoring results at site BPL in June 2012.



3.3.2.1 Environmental Effects

This section describes effects on hydrology and water quality of PacifiCorp's proposed facilities, operations, and environmental measures (as described in Section 2.2). These effects are determined on the basis of changes from current conditions (baseline) as described in the Affected Environment section above. The discussion of effects in this section is divided under subheadings associated with the specific proposed facilities, operations, and environmental measures as they pertain to hydrology and water quality issues.

Effects of Proposed Project Operation with Modified Instream Flow Releases

As described in Section 2.2.2, the Project would continue to be operated in run-of-river mode during all times of generation (i.e., the Powerhouse return flows are not subject to storage and would fluctuate naturally according to East Fork inflow conditions). The automated control system equipment would be set to divert no more than PacifiCorp's water right of 16 cfs, from the East Fork Wallowa River. PacifiCorp proposes modified instream flow releases in the East Fork bypassed reach, consisting of a flow of 4 cfs released year-around from the Project Diversion. In addition, following a planning and construction period of three (3) years, PacifiCorp proposes to reroute the Powerhouse tailrace so that all Powerhouse flows are returned to the East Fork. The goal of these measures is to manage flows in the East Fork in a manner that provides habitat suitable for the production of healthy and sustainable fish populations while continuing to maintain PacifiCorp's ability to generate hydroelectric power.

PacifiCorp conducted an instream flow study of the East Fork using the Instream Flow Incremental Methodology (IFIM) Physical Habitat Simulation System (PHABSIM) in coordination with the Oregon Department of Fish and Wildlife (ODFW), the U.S. Fish and Wildlife Service (USFWS), and the U.S. Forest Service (Forest Service). During the process of conducting the PHABSIM study, the agencies made recommendations on aspects of the study methods and results. These recommendations deal with habitat-related matters that are discussed under Aquatic Resources in Section 3.3.3.

The effects of implementing the instream flow releases on water resources (hydrology and water quality) are discussed below. The instream flow releases are particularly important to protecting and enhancing aquatic resources (such as fish and stream habitat), terrestrial resources (such as amphibians and riparian habitat), and recreational opportunities. The specific effects related to these resources are discussed under Aquatic Resources (in Section 3.3.3), Terrestrial Resources (in Section 3.3.4), and Recreational Resources (in Section 3.3.5), respectively.

Relative to hydrology, the effects of implementing the proposed minimum flow release of 4 cfs year-around to the East Fork would be to increase instream flow releases from the Project Diversion dam to the East Fork bypassed reach by about 3.2 to 3.5 cfs (i.e., the difference between the proposed 4 cfs minimum instream flow release and the 0.5 to 0.8 cfs that is currently released). During the three-year period prior to completing the reroute of the Powerhouse tailrace, overall flows would be increased by the following amounts throughout the East Fork bypassed reach when compared to existing conditions:

- An average increase from 20 cfs to 21 cfs (6 percent) in the reach during the spring runoff higher-flow period (April-July);

- An average increase from 1.8 to 4.4 cfs (140 percent) in the reach during the summer/early fall low-flow period (August-October);

- An average increase from 0.9 to 4.4 cfs (about 4-fold) in the reach during the late fall/winter lower-flow period (November-March).

To further reduce potential scour and sediment mobilization associated with transferring the generation flows to the bypassed reach via the tailrace reroute pipe, water will not be passed through the pipe until the first seasonal high-flow period (June) following construction completion. After tailrace reroute is operational, flows would be increased by about 3.2 to 3.5 cfs (the same as described above) in the upstream[11] portion of the East Fork bypassed reach between the dam and the new tailrace discharge location. In the downstream portion of the East Fork bypassed reach between the new tailrace discharge location and the mouth, flows would be increased by the returned powerhouse diversion amounts (which are currently discharged to the West Fork).

The proposed minimum flow release of 4 cfs year-around and tailrace reroute to the East Fork would result in the following changes in the magnitude of overall flows within the upstream portion (between the dam and the new tailrace discharge location) and downstream portion (below the new tailrace discharge location) of the East Fork bypassed reach when compared to existing conditions[12]:

- An average increase from 20 cfs to 21 cfs (6 percent) in the upstream portion of the reach and 20 to 35 cfs (73 percent) in the downstream portion of the reach during the spring runoff higher-flow period (April-July);

- An average increase from 1.8 to 4.4 cfs (140 percent) in the upstream portion of the reach and 1.8 to 14.7 cfs (over 7-fold) in the downstream portion of the reach during the summer/early fall low-flow period (August-October);

[11] In this Water Resources section, the terms "upstream" and "downstream" are used to differentiate the portions of the East Fork bypassed reach that lay above and below, respectively, the proposed new tailrace discharge location in the bypassed reach. These terms are not to be confused with the terms "upper" and "lower" used in the Aquatic Resources section to differentiate portions of the East Fork bypassed reach from a channel gradient and habitat perspective.

[12] PacifiCorp used historic daily USGS flow data to estimate (synthesize) flow regimes at the proposed minimum flow release of 4 cfs as compared to a baseline (current) minimum flow release of 0.8 cfs. While low in-flow and icing conditions during the winter occasionally result in instream flows below 0.8 cfs, during the summer and fall (June through November) at least 0.8 cfs is released into the bypassed reach. For this reason, 0.8 cfs was used as the baseline for analysis. The historic USGS data used for this synthesis consists of a 45-year record of daily flows (1924 to 1952 and 1967 to 1983) at the Wallowa Falls Powerplant Tailrace (USGS Gage No. 13324500) and the East Fork Wallowa River (USGS Gage No. 13325000), when these gages were simultaneously operating. Further details on the calculation methods for the synthesis of these flow regimes are provided in [***PacifiCorp 2013 (c)***]. *Water Resources Study Progress Report.*

In the Wallowa River downstream of the confluence of the East Fork and West Fork, no Project-related changes in flow would occur because the effects of Project operations on flows dissipate as the East Fork and West Fork join.

- An average increase from 0.9 to 4.4 cfs (about 4-fold) in the upstream portion of the reach and 0.9 to 10.9 cfs (over 10-fold) in the downstream portion of the reach during the late fall/winter lower-flow period (November-March).

After completion of the tailrace reroute, flows in the West Fork (between the current tailrace discharge location and the confluence with the East Fork) would be decreased by the powerhouse diversion amounts (that would be discharged to the East Fork). PacifiCorp used historic daily USGS flow data to calculate the percentage of flow in the West Fork Wallowa River contributed by the Project powerhouse tailrace. The historic USGS data consists of a 15-year period-of-record (1925-1941) when USGS gages were simultaneously operating at: (1) the Wallowa Falls Powerplant Tailrace Near Joseph (USGS Gage No. 13324500); (2) East Fork Wallowa River Near Joseph (USGS Gage No. 13325000); and (3) Wallowa River Above Wallowa Lake Near Joseph (USGS Gage No. 13325500). West Fork flows were determined by subtracting the daily flows at the first and second gages from the third. Assuming that this historic data is indicative of current conditions, changes in the magnitude of overall flows within the West Fork (below the current tailrace discharge location to the confluence with the East Fork) when compared to existing conditions would be:

- An overall average flow decrease of 27 percent;

- An average decrease of 8 percent) during the spring runoff higher-flow period (April-July);

- An average decrease of 30 percent during the summer/early fall low-flow period (August-October);

- An average decrease of 42 percent during the late fall/winter lower-flow period (November-March).

Relative to water quality, the Project facilities and operations do not cause any direct discharge or load of water quality-related constituents to Project waters. However, the diversion of flow has the potential to affect physical flow conditions (e.g., depths, velocities, wetted widths), which could in turn affect water quality parameters influenced by such conditions, particularly water temperature. Physical flow conditions, such as depths, velocities, and wetted widths, would be increased in the East Fork bypassed reach and decreased in the West Fork (below the current tailrace discharge location). These changes in depths and velocities would likely be similar in magnitude to the percentage changes in flow quantities as listed in the bullets above.

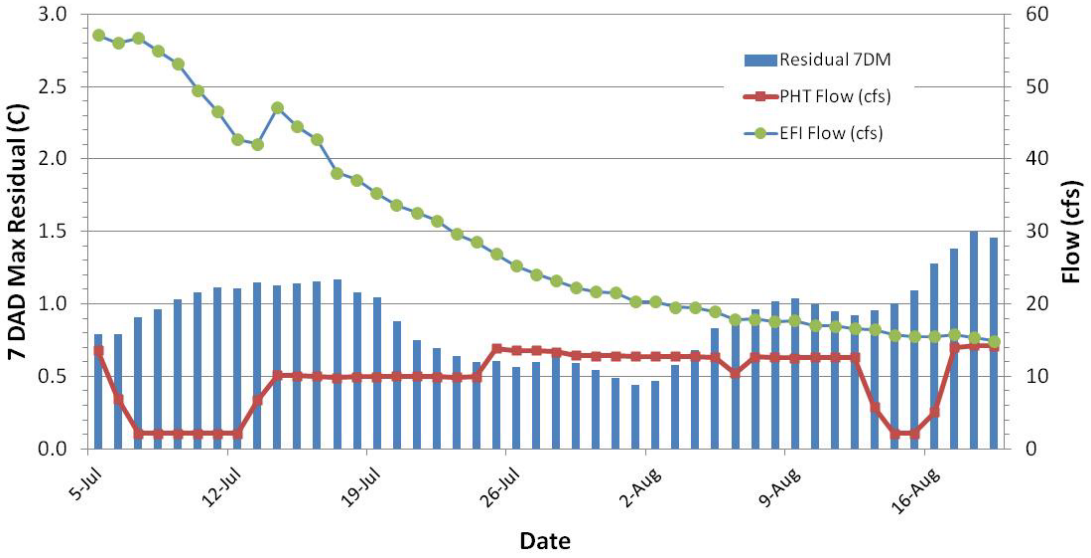
The increase in flows in the East Fork bypassed reach (from the proposed minimum flow release of 4 cfs year-around to the East Fork and the tailrace reroute) could act to moderate the rate of thermal change (due to meteorological conditions) as waters travel down through the reach. As such, it is possible that the increase in flow in the East Fork bypassed reach

may result in cooler temperatures in summer and slightly warmer (non-freezing) temperatures in winter. However, the magnitude of such temperature changes are estimated to be minor.

For example, with regard to East Fork water temperatures in summer, Figure 10 depicts data for the period during summer 2012 when 7-DAD Max values in the East Fork exceeded 12 °C. The columns on the graphs represent the difference (i.e., residuals) between the 7-DAD Max water temperature values at site EFI (representing natural inflow conditions) and site BPL (representing potential Project flow-related effects). These residuals indicate a range in warming of water temperature of about 0.5 to 1.5 °C from site EFI to site BPL during this period of time. As discussed previously, the 1,200-ft change in elevation between sites EFI and BPL is expected to have a direct effect on the rate of stream heating due to adiabatic lapse rate of air temperature, which warms by about 2 to 3.5 °C per 1,000 feet of elevation.

The lines in Figure 10 show corresponding inflows to the Project area at EFI and the concomitant diverted flow amounts to the Powerhouse (site PHT). Two periods of Powerhouse outage occurred during this time: July 7 to July 12 and August 13 to August 16. Therefore, these two time periods are assumed to be indicative of natural background warming conditions when no Project operations were occurring. However, no systematic change in the residuals is evident when comparing the values at these non-operational times with the times before and after. The day-to-day variability in the residuals is likely otherwise due to day-to-day variability in meteorological conditions (e.g., air temperatures). As such, a significant Project-related effect is not evident over the period of time when 7-DAD Max water temperature values in the East Fork were greater than 12 °C. (Note: data for the similar period during 2013 is not depicted as the Powerhouse was operating throughout the period, so that no comparable non-operational conditions occurred.)

Figure 10. Residual 7-DAD Max water temperature between sites EFI and BPL and corresponding flows at sites EFI and PHT during July 5 – August 20, 2012.



Under proposed Project operations, the absence of Powerhouse tailrace flows in the West Fork (due to the tailrace reroute) is likely to have the opposite effect on water temperatures as would occur in the East Fork. In the West Fork, slightly warmer temperatures in summer are likely to occur in the 0.5-mile distance between the existing tailrace discharge location and the confluence with the East Fork because the slightly cooler tailrace flows will be rerouted to the East Fork rather than discharged to the West Fork.

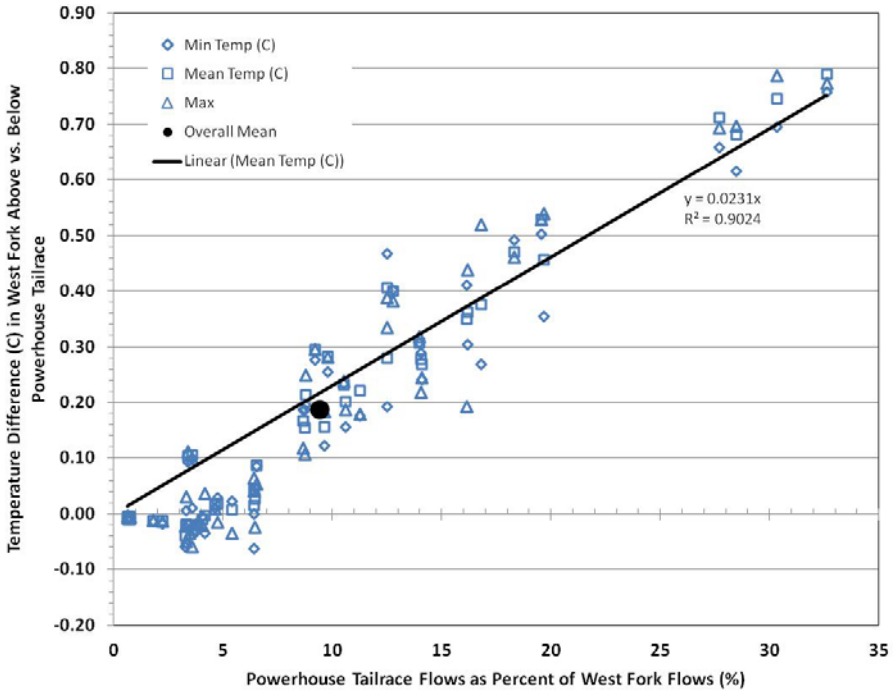
To estimate the magnitude of the slightly warmer water temperatures in the West Fork resulting from the proposed tailrace reroute, a conservative mass-balance equation[13] was applied using water temperature data for the period July 1 to August 20, 2012. This period includes the warmest period where water temperature data were simultaneously collected in the West Fork above the tailrace discharge location (site WFI) and the tailrace discharge (site PHT) during the study period (PacifiCorp 2013c).

Calculated water temperature values for the West Fork downstream of the Powerhouse tailrace location were subtracted from the concurrent values for the West Fork upstream of the tailrace location based on the actual thermograph-derived values from site WFI. The subtracted values (i.e., differences) represent the amount of warming (or, in a few cases, cooling if the differences are less than zero) that occurs as a result of the tailrace discharge.

[13] The mass-balance equation is in the form of a simple mixing equation[13], $Q_{US}*T_{US} + Q_{PHT}*T_{PHT} = Q_{DS}*T_{DS}$, where Q represents flow, T represents water temperature, PHT denotes the Powerhouse tailrace discharge, US denotes the West Fork upstream of the tailrace discharge, and DS denotes the West Fork downstream of the tailrace discharge.

The temperature differences are plotted in Figure 11 as a function of the percent of the flow in the West Fork that is comprised of Powerhouse tailrace flows (in percent). For example, a Powerhouse tailrace flow of 10 cfs comprises 25 percent of a West Fork flow of 40 cfs.

Figure 11. Differences in calculated water temperature values (°C) for the West Fork upstream and downstream of the Powerhouse tailrace location plotted as a function of the percent of the flow in the West Fork that is comprised of Powerhouse tailrace flows (in percent).

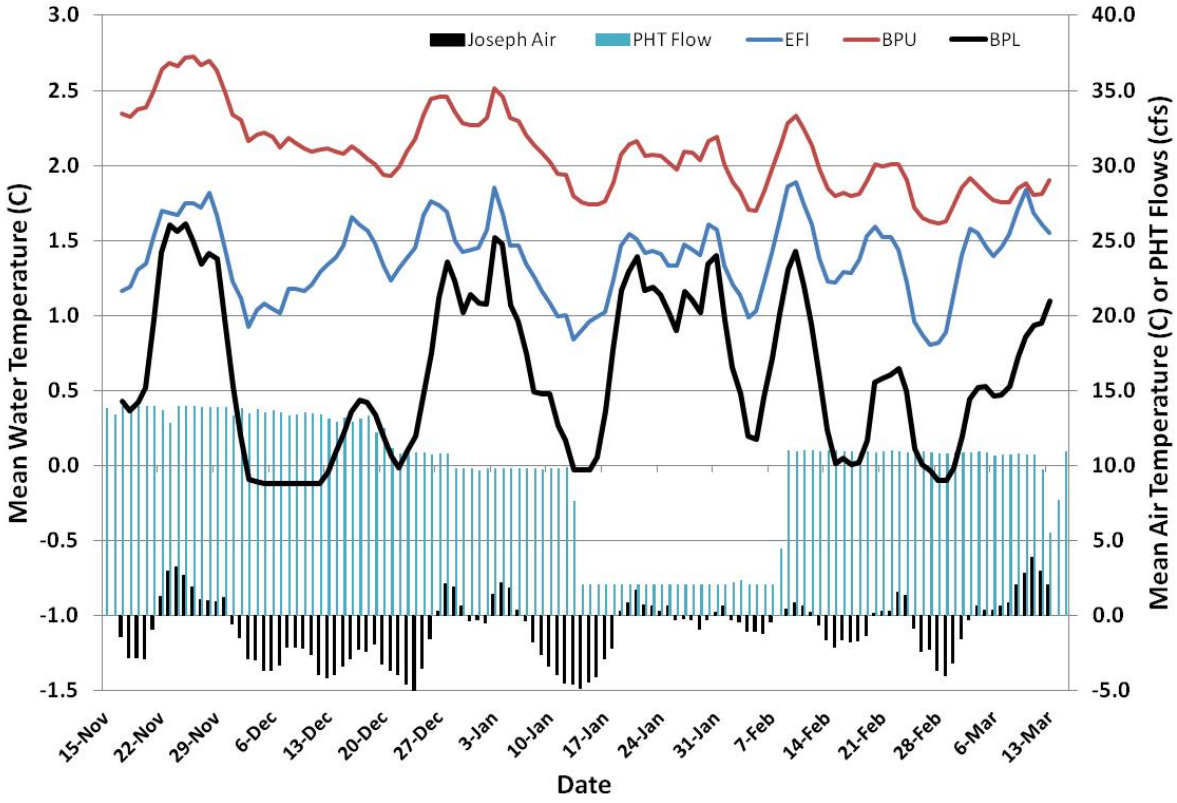


The temperature differences shown in Figure 11 indicate that during the warm period of July 1 to August 20, 2012, Powerhouse tailrace flows made up as much as about 33 percent of West Fork flow and cooled the West Fork by as much as about 0.8°C. As an overall mean during the period, Powerhouse tailrace flows made up about 10 percent of West Fork flow and cooled the West Fork by about 0.2°C. These results indicate that, absent Powerhouse tailrace flows, flows in the West Fork between the existing powerhouse tailrace and East Fork confluence will decrease on the order of 10 to 33 percent during the peak summer warm period. Lower flows at this time will increase daily water temperatures within this reach of the West Fork by about 0.2°C on average, and as much as about 0.8°C.

In winter, the proposed increase in flow in the East Fork bypassed reach may result in slightly warmer (non-freezing) temperatures, although the magnitude of such temperature changes are estimated to be minor. Water temperature data collected from the lower end of the East Fork bypassed reach (site BPL) during this study indicate that water temperatures dropped to 0 to -0.1°C on several days during winter, confirming the likelihood of instream ice formation.

As an illustration, daily mean water temperature values are shown in Figure 12 for sites BPL, BPU, and EFI for the period November 15-March 15, 2012, along with the concurrent mean air temperatures recorded at the Joseph Airport and the mean daily flow from the Powerhouse tailrace (site PHT). As expected, freezing water temperatures at site BPL occurred coincident with subfreezing air temperatures (Figure 12). However, it is notable that water temperatures did not reach freezing levels (0°C or less) at either of the upstream, higher-elevations EFI and BPU sites on the East Fork (Figure 12).

Figure 12. Daily mean water temperature values at sites BPL, BPU, and EFI for the period November 15-March 15, 2012, along with the concurrent mean air temperatures recorded at the Joseph Airport and the concurrent flows diverted to the Powerhouse.



The reasons for the episodes of freezing water temperatures at site BPL, but not at sites EFI and BPU, are not specifically known, but are likely a combination of factors. For example, key factors likely include: (1) a much larger relative magnitude of baseflow at site EFI that likely increases the groundwater-related thermal load present at site EFI; (2) thermal mass provided by the Project forebay's water volume, which further retains thermal load at site BPU (which is located just below the forebay); (3) possible occurrence of winter air temperature inversion that causes cold air pooling around the area of site BPL; and (4) more turbulent stream hydraulics at the upstream sites that may further affect the occurrence of ice formation.

Figure 12 includes a 25-day period from January 14 to February 7, 2012 when diversions of flow to the Powerhouse were not occurring. Mean air temperatures recorded at the Joseph Airport were subfreezing on 15 of the 25 days during this period (Figure 12), yet slightly warmer, and non-freezing, water temperatures occurred at BPL throughout the period. These slightly warmer water temperatures at BPL at this time indicate that higher bypass instream flow releases (as would occur under proposed Project operations) could play a further role in reducing ice formation in the East Fork bypassed reach.

With the exception of possible minor effects on water temperature in the affected reaches of the East Fork and West Fork as described above, effects of the proposed 4-cfs instream flow release and the tailrace reroute on other water quality constituents are not anticipated (PacifiCorp 2013c). The primary potential Project effect on DO under current and proposed Project operational conditions is the diversion of flow from the East Fork that has the potential to affect physical flow conditions (e.g., flow quantity, depths, and velocities in the bypassed reach), which in turn could affect aeration of waters affected by such conditions. Such effects have the potential to affect DO by increasing the amount of oxygen entering the water from surrounding air. However, no effects on DO occur under current operations or are expected from the proposed flow changes in this case. Project facilities and operations do not cause or contribute to any oxygen-demanding substances in Project waters. Furthermore, the relatively high gradient of stream channels in the Project area creates sufficient turbulence to maintain efficient aeration of Project waters.

As discussed above, the monitoring data indicate that DO is fully saturated (consistently 98 to 105 percent) in waters of the Project area. The State of Oregon standard indicates that DO in streams may not be less than 95 percent saturation when trout spawning through fry emergence occurs or less than 90 percent saturation as an absolute minimum (OAR 340-041-0016). DO values were above 95 percent saturation at all times during PacifiCorp's study (PacifiCorp 2013c).

No effects on TDG occur under current Project operations or are expected from the proposed operations. All TDG measurements (in percent-saturation) at the powerhouse tailrace site were at or near 100 percent saturation (i.e., average of 98 percent saturation; range 96 to 100 percent saturation). These values indicate that TDG supersaturation (i.e., TDG saturation greater than 110 percent) from potential turbine air entrainment is not a concern at the Project powerhouse.

The State of Oregon standard indicates that TDG may not exceed 110 percent saturation at the point of sample collection and may not exceed 105 percent saturation in waters less than two feet in depth (OAR 340-041-0031). As such, the TDG values measured at all times during this study at the powerhouse tailrace meet the State standard's 105 or 110 percent saturation criteria.

Effects of Construction of Proposed Project Facilities and Implementation of Associated Best Management Practices (BMPs)

As described in Section 2.2.1, the proposed Project tailrace reroute facilities would include construction of a new intake structure near the existing Powerhouse tailrace, a new buried conveyance pipeline (consisting of a 30-inch diameter, 1,000-foot (305 m) long pipe), and a reinforced concrete outfall structure that would discharge Powerhouse flows back to the East Fork Wallowa River.

As described in Section 2.2.1, PacifiCorp also proposes to install a new and improved gage to monitor instream flows in the East Fork bypassed reach between the Project dam and the proposed new tailrace discharge location. This would involve construction to install a permanent long-throated open flume (25-ft long and 20-ft wide) located in the East Fork bypassed reach approximately 0.7 mi downstream of the Project Diversion dam near the existing forebay access road bridge site (see Appendix A for map showing the new gage location).

As described in Section 2.2.3, PacifiCorp would implement a number of BMPs for erosion, sediment, and spill prevention and control during proposed construction activities. BMPs would be determined in consultation with and approved by applicable regulatory agencies, such as DEQ (related to applicable 401 Water Quality Certification) and the U.S. Army Corps of Engineers (related to applicable 404 Removal-Fill Permits). PacifiCorp will obtain necessary approvals and permits for these construction activities. PacifiCorp or responsible contractors will adhere to and implement the requirements of necessary approvals and permits, including (but not necessarily limited to) required measures or best management practices (BMPs) related to in-channel work, equipment use, materials handling, minimization of riparian and channel disturbance, sedimentation and erosion control, and post-construction site restoration.

From a water quality perspective, short-term (temporary) increases in turbidity and suspended sediment in the East Fork are expected as a result of the construction activities associated with the construction of the proposed tailrace reroute and proposed gage (flume) installation. These short-term construction-related effects could occur from the potential temporary placement of a cofferdam and excavation and disturbance of stream channel substrate in the localized area of the proposed discharge pipe outfall.

Although such construction activities in and along the East Fork would be unavoidable, they are not expected to adversely affect overall water quality conditions within the bypassed reach. The area of construction-related activities, extent and duration of in-water work, and associated disturbance would be relatively small, and the construction-related effects would be short-term and temporary in nature. In addition, the implementation of the proposed construction-related BMPs (as described in Section 2.2.3) would be expected to prevent or

minimize the discharge of eroded soils, sediments, or other potential contaminants into the stream channel that might be caused from construction activities.

Effects of Proposed Project Flow Monitoring

PacifiCorp proposes to install a new and improved gage (consisting of a long-throated open flume) to monitor instream flows in the East Fork bypassed reach between the Project dam and the proposed new tailrace discharge location (as described in Section 2.2.1). PacifiCorp currently maintains a gage just downstream from the Project dam that serves as the existing FERC-compliance point for monitoring instream flow The new gage (flume) will be located in the East Fork bypassed reach approximately 0.7 mi downstream of the Project dam near the existing forebay access road bridge site (see Appendix A for a map showing the new gage location). Several attributes make this location advantageous and preferable, including that this location: (1) is above the migratory fish barrier and will not entail gage construction or operation in bull trout critical habitat; (2) avoids high-gradient turbulent channel areas where it would be difficult to construct and maintain a gage; (3) provides the most suitable channel geometry for gage installation and accuracy; (4) is easily accessible for efficient and timely maintenance of the gage and downloading of data; and (5) it is near other project features and is inside the proposed FERC boundary..

The new gage (flume) will have several advantages compared to the current gage and other potential alternative flow measuring devices, including that the type of flume as proposed is more accurate, has better technical performance, can be computer designed and calibrated to specific site conditions, and can more effectively pass sediment and debris (Clemmens et al. 2001, Wahl et al. 2000). The ability to more effectively pass sediment and floating debris (e.g., woody debris) is a particularly important advantage of this type of flume for the East Fork bypassed reach. The effect of the proposed new gage installation would be to provide improved verification that proposed modified instream flow releases to the East Fork bypassed reach are being implemented as planned.

Effects of Proposed Sediment Management Program for Forebay Maintenance Flushing

As described in Section 2.2.2, it is necessary to flush accumulated native sediment from the Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to cease the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period and flush sediment from the forebay during peak spring runoff in the month of June. Annual forebay flushing would result in the removal of approximately 250 to 500 cubic yards of accumulated sediment from the forebay and the mobilization and transport of that sediment into the East Fork bypassed reach. Under the proposed sediment management program, flushing would also occur relatively quickly, with the flushing lasting no more than 24 to 72 hours.

The effects on water resources (water quality) of implementing the proposed sediment management program for forebay maintenance flushing are discussed below. The proposed sediment management program is particularly important for protecting fish and macroinvertebrates, and aquatic and riparian habitat. The specific effects related to these resources are discussed under Aquatic Resources (in Section 3.3.3) and Terrestrial Resources (in Section 3.3.4). A Turbidity Monitoring Plan for Maintenance Forebay Flushing is provided in Appendix D.

Relative to water quality, the effects of implementing the proposed sediment management program for forebay maintenance flushing would be to minimize the magnitude and duration of potential increases in suspended sediments and turbidity in the East Fork bypassed reach and the Wallowa River below the confluence with the East Fork. Conducting the forebay flushing action during high-flow peak runoff would allow turbidity and fine sediments to pass when levels are already naturally elevated. Also, by conducting the forebay flushing action relatively quickly during the peak flow period, sediment deposition in the East Fork downstream of the forebay would be minimized by allowing as much fine sediment as possible to move downstream through the bypassed reach. Subsequent peak flows would continue to move sediment out and minimize deposition through the bypassed reach.

From a water quality perspective, forebay flushing would be expected to cause short-term (temporary) increases in turbidity and suspended fine sediments downstream in the East Fork bypassed reach and in the Wallowa River downstream of the mouth of the East Fork. However, the proposed flushing of the forebay during the June high flow period would be expected to minimize the relative increase in turbidity and suspended fine sediments over natural baseline conditions. In addition, the concentration of turbidity and suspended sediments resulting from the forebay flushing would be limited in duration to a single event (annually) of 24 to 72 hours.

Effects of Turbidity Monitoring Plan Associated with Forebay Maintenance Flushing

As described in Section 2.2.3, PacifiCorp proposes to implement a Turbidity Monitoring Plan during forebay flushing to assess and verify the effectiveness of the sediment management program for forebay maintenance flushing. The effect of this measure would be to provide verification that the sediment management program is being implemented as planned.

3.3.3 Aquatic Resources

This section describes the existing conditions in the Project area related to fisheries and other aquatic resources. This includes the aquatic species that currently exist and how they are affected by existing Project facilities and operations. The descriptions in this section serve as the baseline against which the effects on aquatic species of proposed Project facilities and operations are assessed below.

Affected Environment

Aquatic Habitat in the Project Area

The Project forebay is approximately 0.2 surface acres (0.08 ha) in size and averages 5 feet (1.5 m) deep. Because the Project operates as run of river, there is no measurable storage. Though no measurable storage is present in the forebay, habitat in this area is lacustrine, and given the shallow water depth no thermal stratification is present. Substrate in the forebay consists of deposited silt, sand, and other glacial fines. PacifiCorp documented four juvenile brook trout in the forebay during a 2013 snorkel survey.

Water diverted at the forebay travels through the flow line and penstock to the generating turbine in the Project powerhouse. Penstock failures in 1995, 1996, and 1999 resulted in uncontrolled releases of water to the bypassed reach. Though no quantitative data is available concerning effects to aquatic habitat from these uncontrolled water releases, it is assumed that resulting bank erosion caused harmful effects to aquatic organisms residing within the stream.

Water exits the turbine and is discharged into an approximately 985-foot (300 m)[14] long tailrace discharge channel that empties into the West Fork Wallowa River. This channel has an average wetted-width of 10 feet (3.1 m) and an average depth of one foot (0.3 m). The habitat type within the tailrace channel is dominated by high gradient riffle with very few pools. The biggest risk to aquatic organisms residing within the Project Tailrace comes during unintended dewatering of the channel during unit trips that cause the headgate to drop, resulting in loss of penstock pressure. The tailrace channel eventually goes completely dry if the tripped unit is not brought back online within 2.5 hours, resulting in total desiccation of aquatic organisms in the tailrace at the time.

PacifiCorp (2012 and 2013) has documented bull trout (*Salvelinus confluentus*), brook trout (*Salvelinus fontinalis*), kokanee (*Oncorhynchus nerka*), rainbow trout (*Oncorhynchus mykiss*), mountain whitefish (*Prosopium williamsoni*), and sculpin (*Cottus* ssp.) present in the Project tailrace channel and East Fork Wallowa River bypassed reach.

Local topography divides the 1.7-mile East Fork Wallowa bypassed reach into distinct lower and upper segments. The lower segment of the bypassed reach (lower bypassed reach) is 4,700 feet (1,433 m) long and has an average slope between 6% and 7%. Substrate is comprised chiefly of cobble and boulder. The predominant mesohabitat types include sequences of steep riffles and rapids. Individual pools are present in the lower bypassed reach, but they are rare. The upper segment (upper bypassed reach) is 4,370 feet (1,332 m) long and has an average slope between 19% and 20%. Steep cascades with turbulent flow

[14] This figure only includes the primary tailrace channel. There are approximately 1,320 feet (402 m) of additional braided tailrace side channels. No fish species have ever been documented in the tailrace side channels.

over boulders and bedrock chutes characterized the upper segment. The two segments are divided by a 12-foot (3.7 m) falls, an impassable fish barrier.

The lower bypassed reach is a valuable feature for aquatic resources in Wallowa Lake because it provides scarce spawning and rearing habitat for the species present, including Endangered Species Act (ESA) listed bull trout. The upper bypassed reach, though permanently inaccessible to bull trout and other migratory species, provides limited habitat for rainbow and brook trout out-migrating from Aneroid Lake upstream.

Since the construction of the Wallowa Falls Hydroelectric Project, relatively low minimum flows have been maintained in the bypassed reach. In fact, the minimum flow restrictions stipulated in the existing license are considered to be one of the limiting factors of habitat for fish in the bypassed reach.

Channel alteration is an additional effect on fish habitat in the bypassed reach. More than one-third of the lower bypassed reach has been altered by residential development. Actions such as channelization and bank armoring have resulted in an incised and confined channel with relatively high water velocities. Upstream of the residential area, on land owned by PacifiCorp, the lower bypassed reach retains many of its natural energy dissipation features, including channel sinuosity, side/braided channels, and connectivity with the floodplain.

Lack of spawning-sized substrate throughout the lower bypassed reach also contributes to the degraded habitat conditions. The downstream transport of finer substrates is obstructed by the Wallowa Falls diversion dam and the Project forebay. Periodic flushing of the forebay helps augment the bypassed reach with finer substrates, but the forebay flushing schedule has been suspended in recent years due to regulatory implications related to the discovery of bull trout in the bypassed reach.

The West Fork Wallowa River section between the confluence with the Project tailrace channel and the confluence with the East Fork Wallowa River is approximately 1,200 m in length with an average wetted-width in this section of 17 m. The West Fork Wallowa River is a high-energy, high velocity river and the substrate in this section is dominated by large boulders and cobble. The Project currently discharges the full powerhouse flow (up to 16 cfs) into the West Fork. This contribution to the West Fork makes up about 30 percent on average of the total flow of the West Fork Wallowa River during the late summer spawning period. After the West Fork and East Fork join, the Wallowa River flows for about 0.6 miles to Wallowa Lake. The Wallowa River is a relatively rapidly-flowing river along this stretch, with substrate dominated by cobble, boulders, and gravel. Because flows from the West Fork and East Fork are joined in this stretch, effects from Project operations in this reach have been attenuated and are no longer present as the Wallowa River flows to Wallowa Lake. Wallowa Lake is a natural glacially-scoured lake which contains deep and highly stratified lacustrine habitat. Species present in the lake include those noted above for the river areas

plus lake trout (*Salvelinus namaycush*), large-scale sucker (*Catostomus macrocheilus*), bridgelip sucker (*Catostomus columbianus*), and dace (*Rhinichthys sp.*).

Wallowa Lake and portions of the East and West Forks of the Wallowa River are listed under the Bull Trout Critical Habitat Designation Final Ruling (Federal Register, Vol. 75, No. 200 – October 2010 pgs. 63,898 – 64,070). The waterways upstream of the irrigation dam at the terminus of Wallowa Lake are listed as Essential Fish Habitat for spring Chinook and Coho under the Magnuson-Stevens Fishery Conservation and Management Act (NOAA 2008).

Fish Community in the Project Area

Background Information

Fish species known to occur by direct observation in waterways within the Project area include rainbow trout, kokanee, brook trout, ESA-listed bull trout, mountain whitefish, and sculpin. Fish abundance, distribution, and species composition information comes mainly from the following three data sources:

(1) Oregon Department of Fish and Wildlife (ODFW) annual fish propagation reports;

(2) Fish salvages of the approximately 985-foot (300 m) long tailrace discharge channel immediately downstream of the Project powerhouse. Salvages were performed prior to or during de-watering events in 2009-2013; and,

(3) PacifiCorp's FERC relicensing fishery surveys performed in 2012 and 2013.

According to the 2012 ODFW Propagation Annual Report, Aneroid Lake, a small highland lake with an outlet to the East Fork five miles upstream of the Project forebay, was most recently stocked with 4,000 Cape Cod strain rainbow trout fingerlings in 2011 (ODFW 2012). Aneroid Lake currently is on a three-year stocking cycle. This same strain of rainbow trout is also annually stocked in Wallowa Lake (ODFW 2012). Cape Cod strain rainbow trout are generally thought to have lower migrating tendencies as compared to other strains of hatchery rainbow trout utilized in Oregon (Kinunen and Moring 1976). It is assumed that rainbow trout within the Project area are mainly comprised of these hatchery plants.

Historically, Wallowa Lake supported a native stock of kokanee. The native population experienced a precipitous collapse in the early 1960's, which lead to artificial supplementation of kokanee from sources located out of basin. The lake was last stocked with kokanee in 1982. The current population is self-sustaining though genetically not comprised of the native stock (Cramer and Witty 1998). In the past, kokanee have been known to spawn in the lower gradient reaches of both the Project tailrace channel and the East Fork bypassed reach.

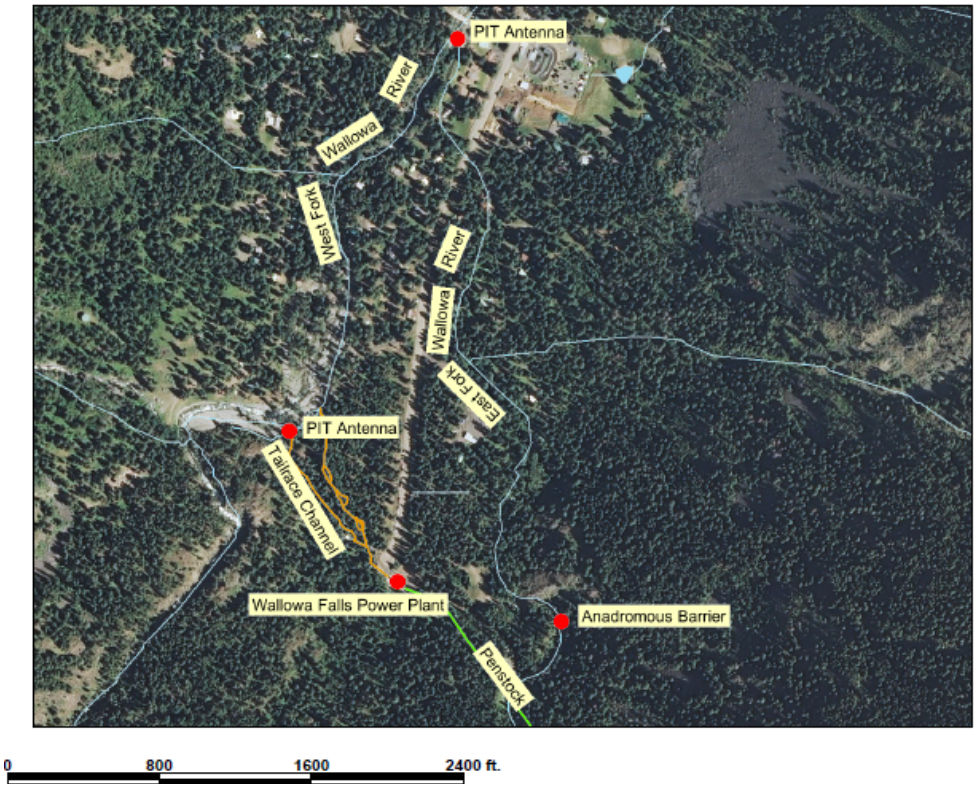
Non-native introduced brook trout are also found within the Project area. Brook trout were stocked in Aneroid Lake starting in the early 1900's with the last hatchery plant occurring in the 1950's (Pers. Comm. Bill Knox, ODFW, September 2010). These fish have naturally persisted and are dispersed throughout the Project area.

At this time, the specific strain or local population origin of bull trout inhabiting the Project area are not known. Most native stock bull trout were thought to be extirpated by the late 1950's during an eradication effort to reduce predation and competition on rainbow trout within Wallowa Lake. This local extirpation led to a hatchery reintroduction program in 1968, when bull trout and Dolly Varden (*Salvelinus malma*) from an Alaskan hatchery were released into Wallowa Lake. This reintroduction program was believed to have failed and was discontinued in 1978 (Buchanan et al. 1997). In 1997, ODFW released 600 bull trout ranging in size from 70 – 380 millimeters (mm) into Wallowa Lake. These fish were salvaged from a decommissioned hydroelectric plant's power canal located on Big Sheep Creek in the Imnaha River drainage. No monitoring was conducted of these released bull trout, but catches of bull trout showed up periodically in lake creel surveys after the 1997 release until 2004 (Pers. Comm. Bill Knox, ODFW, September 2010). Based on the lack of bull trout observed from 2004 onward, bull trout in Wallowa Lake were once again identified as extirpated in 2005 (Goodson et al. 2005). More recently, bull trout were once again observed by PacifiCorp in 2010. To date, 119 bull trout have been captured, handled, and released from areas within or in the vicinity of the Project area. Mountain whitefish, large-scale suckers, and sculpin in the Project vicinity are assumed to be of native stock origin and naturally persist within the Project area.

2012 Aquatic Species Composition Survey Results

Electrofishing surveys were performed of the entire natural channel of the East Fork Wallowa River below the anadromous fish barrier (Figure 13), a portion of the East Fork Wallowa River above the anadromous fish barrier, and the entire Project tailrace channel.

Figure 13. Site Map of Study Area.



Triple-pass depletion electrofishing methods with the use of block-nets were employed in the lower gradient, first 500 meters (m) of the East Fork Wallowa River natural channel and of the entire Project tailrace channel. Due to high gradient, and high water velocity, the upper approximately 350 m of available habitat below the anadromous fish barrier in the East Fork Wallowa River natural channel was single-pass electrofished only, without the use of block-nets. The approximately 100 m section surveyed above the anadromous fish barrier in the East Fork Wallowa River natural channel was also single-pass electrofished only with no block-nets.

The lower 500 m of the East Fork Wallowa River natural channel and the entire tailrace channel were broken into 100 meter sections. Using block-nets, each section was depletion electrofished using a three-pass method with a Smith-Root® model LR-24 backpack electrofisher. During each electrofishing pass, all captured fish were quantified to species, measured to the caudal fork and then released back to the stream, below the downstream block-net so as to avoid recapture during the next electrofishing pass. Surveys started at the downstream end and progressed upstream (Nielsen and Johnson 1983).

In addition to recording standard biological data for captured species during electro-fishing surveys, the Forest Service and Oregon Department of Fish and Wildlife requested that condition factors also be recorded from fish captured in the East Fork Wallowa River natural

channel. To that end, it was decided that a sub-sample of captured fish by species from the natural channel would also be weighed to the nearest gram. Weights were recorded of the first 25 specimens collected per species in the natural channel only. After the first 25 specimens per species were collected, weights were then recorded from a 10 percent sub-sample per species. Lengths and weights of East Fork Wallowa River natural channel captured fishes were then converted to represent a condition factor.

Condition factor (K-factor) is a simple weight-length relation that is generally thought to be one of several indices of healthy fish (Nielson and Johnson 1983). Fulton (1902) established the weight-length relation equation that was used to estimate K-factors in this study.

The Fulton-type equation used is as follows;

K= (W/L^3)*X

Where;

K = metric condition factor

W = weight in grams

L = length in millimeters

X = Arbitrary scaling constant (for our purposes 10^5 was used)

All fish were weighed individually while in water. Fish were weighed to the nearest gram using a portable scale. To weigh fish, a container holding water was placed on the scale and allowed to tare to 0, the captured fish were then placed in the container and the weight recorded.

If bull trout were encountered during any electrofishing survey, a small 1 square centimeter (cm) tissue sample (as recommended by the USFWS Abernathy Conservation Genetics Lab standard protocol) was taken from each fish for future genetic analysis. If the captured bull trout was >120 millimeters (mm) in fork length (FL), a uniquely coded 13 mm half-duplex (HDX) Passive Integrated Transponder (PIT) tag was inserted into the dorsal sinus for identification in case of future recapture. The PIT tag was inserted using a tagging syringe with the needle positioned just anterior to the dorsal sinus and the tag gently pushed toward the caudal peduncle, through the incision, into the sinus. This same tagging procedure has been occurring for all maiden captured bull trout on the Lewis River in Southwest Washington since 2002 with no known tag mortalities and little to no tag loss (PacifiCorp Energy 2011).

All electrofishing activities followed protocols as set forth in the National Marine Fisheries Service Backpack Electrofishing Guidelines (NMFS 2000). Generally, the electrofisher was set to un-pulsed direct current (DC) at the lowest possible setting to still allow capture of fish. Care was taken during electrofishing surveys to stay away from actively spawning fish and newly constructed redds.

Along with the electrofishing surveys in the East Fork Wallowa River natural channel and Project tailrace channel, seining surveys of the Project reservoir/forebay also occurred during a seasonal time-frame.

The Project impoundment was sampled with a 2 m deep, 30 m long stick seine with 6 mm mesh. Given the small size of the impoundment (0.2 surface acres), the entire area was sampled.

East Fork Wallowa River Natural Channel

The East Fork Wallowa River natural channel was electrofished on August 23-24, 2012 from the confluence of the West Fork Wallowa River to its anadromous fish barrier. During this time-period, 479 total fish were captured (Figure 14), biologically assessed, and then released back to point of capture. No fish mortalities were observed. Captured fish were quantified by species as well as capture location within the stream (Figure 15).

Figure 14. Species Composition Survey East Fork Wallowa River natural channel.

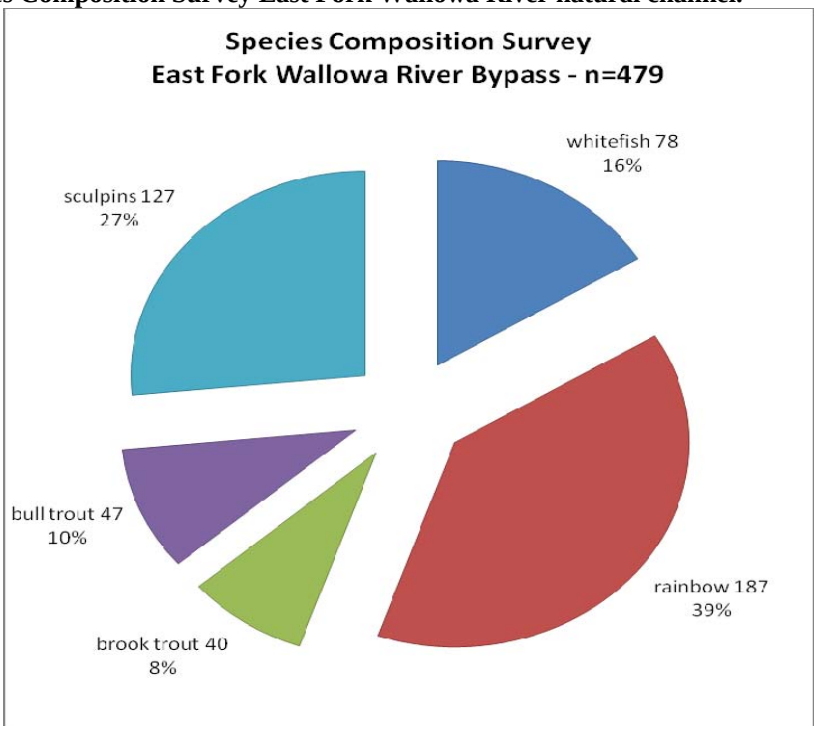
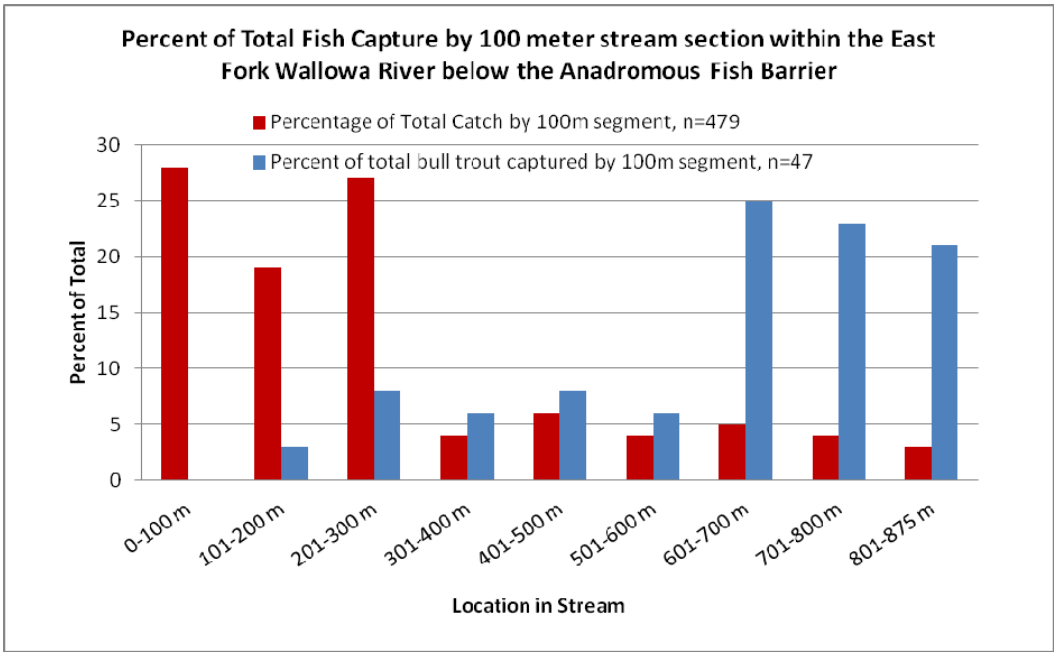


Figure 15. Percent of Total Fish Capture by 100 Meter Stream Section within the East Fork Wallowa River below the Anadromous Fish Barrier.



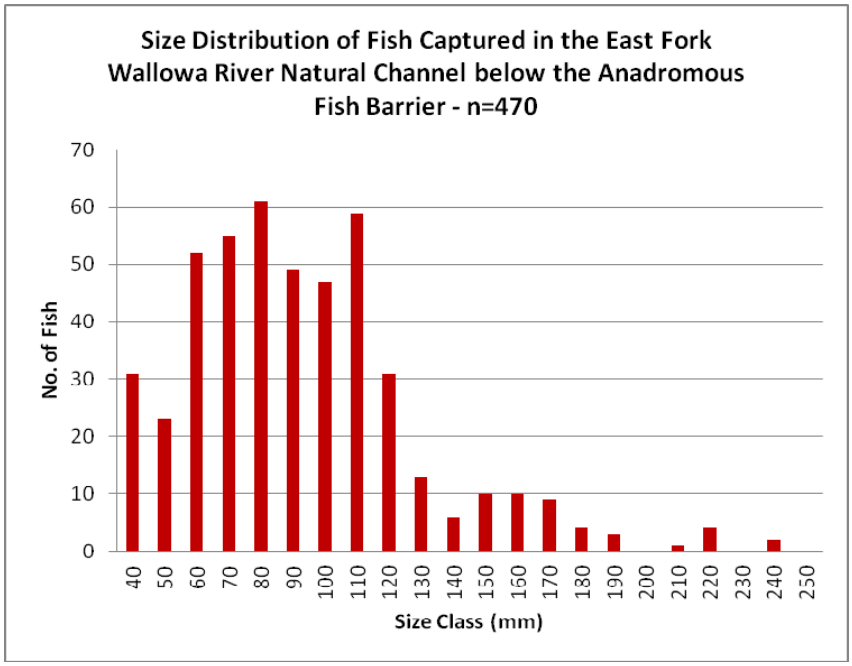
Seventy-four percent of the total fish captures were collected in the lower 300 m of the survey area. Conversely, 69 percent of the total captured bull trout were encountered in the upper 300 m of the survey area below the anadromous fish barrier (Figure 15). Mountain whitefish and sculpin were not observed above the 300 m section in the East Fork Wallowa River natural channel. At this location in the stream there is a small step pool that may be an upstream migration hindrance during certain times of the year and under certain flow conditions. All captured fish were measured to the caudal fork (Table 10).

Table 10. Biological information of East Fork Wallowa captured fishes.

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
rainbow trout	187	97	34.09	240
mountain whitefish	78	107	22.13	164
brook trout	40	129	49.73	228
bull trout	47	113	44.46	245
sculpin	127	68	21.07	111

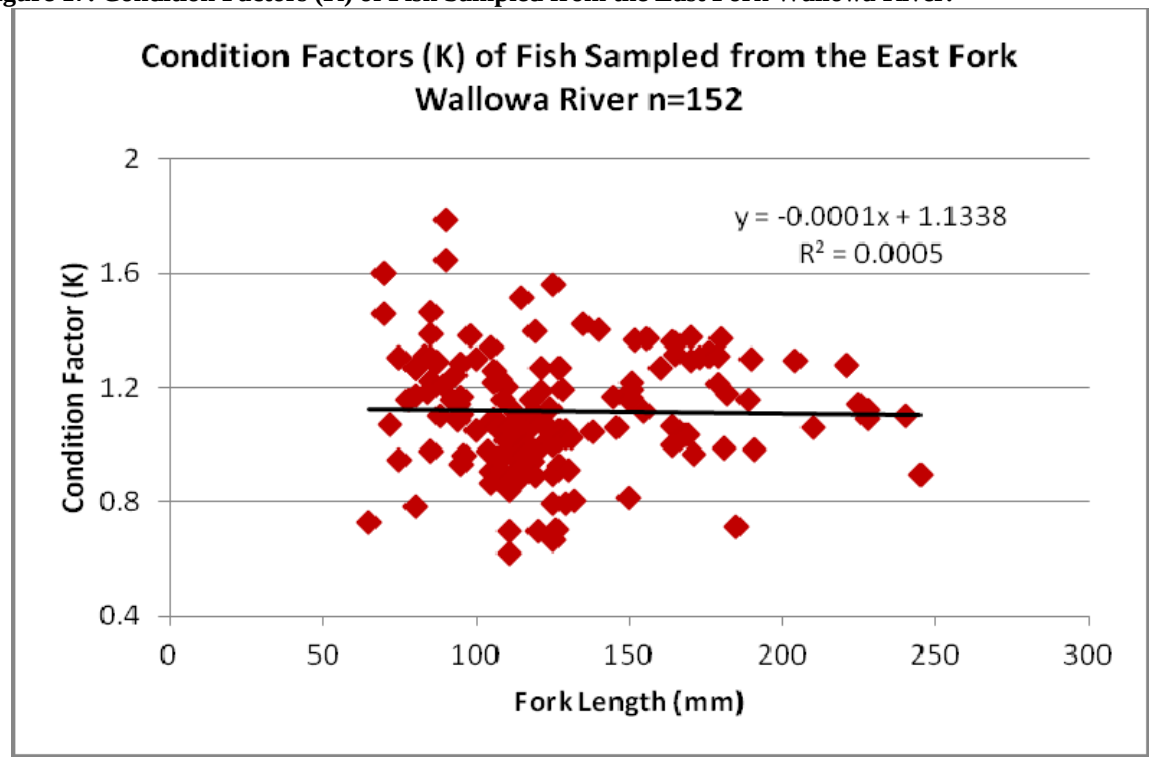
Nearly 99 percent of captured fishes were <200 mm fork length as Figure 16 illustrates.

Figure 16. Size Distribution of Fish Captured in the East Fork Wallowa River Natural Channel below the Anadromous Fish Barrier.



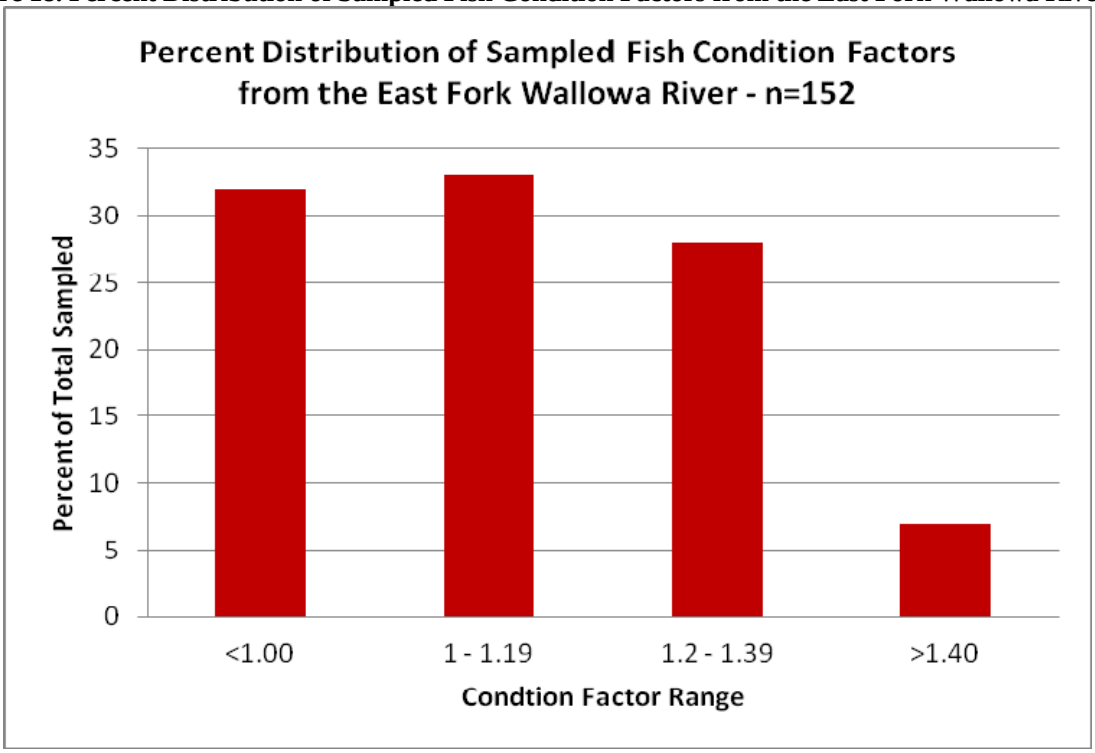
Of the 479 fish captured, 152 were also weighed (32 percent) and characterized with a K-factor (Figure 17). Of the fish assessed for K-factor, 63 were rainbow trout (1.19 K-factor average), 35 were mountain whitefish (1.04 K-factor average), 32 were bull trout (1.00 K-factor average), and 24 were brook trout (1.25 K-factor average).

Figure 17. Condition Factors (K) of Fish Sampled from the East Fork Wallowa River.



Each red diamond in Figure 17 represents an individual fish. Figure 18 displays the same fitness information in a bar graph. Qualitative values such as poor, fair, excellent, etc. are not expressed within the scale. There is currently no localized set of data with which to compare the present data-set to in order to give the assigned K-factors a more descriptive assessment.

Figure 18. Percent Distribution of Sampled Fish Condition Factors from the East Fork Wallowa River.



An additional water fall of 23 m (approximate height) exists 100 meters upstream from the lower most anadromous fish barrier in the lower East Fork Wallowa River. The stream segment between these two waterfalls was electrofished for fish presence twice during 2012 field activities, once on August 25 and again on September 25. Three fish were captured during the August 25 survey, and eight fish were captured during the September 25 survey (Table 11). All captured fish in this section of the river were downstream migrants originating from areas upstream due to the total passage barrier downstream of the survey area.

Table 11. Biological information of captured fishes from above anadromous fish barrier on the East Fork Wallowa River.

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
rainbow trout	1	n/a	n/a	60
brook trout	10	133.3	61.39136747	225

Of the eight brook trout sampled during the September 25 survey, one male was post-spawn and two other captured males were highly fecund.

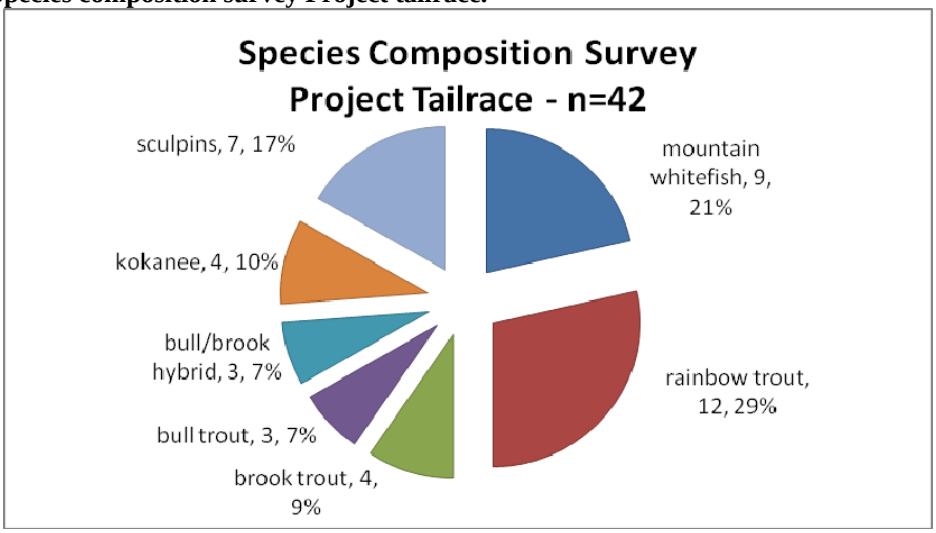
Along with the stream sections sampled above and below the anadromous fish barrier, the Project forebay was also sampled for fish presence on August 22 and September 25. During

the August 22 survey the entire forebay was seined and no fish were captured. The forebay was again scheduled to be seined on September 25. Prior to the scheduled seining survey, the forebay was snorkeled for fish presence. No fish were observed during the snorkeling survey and therefore the area was not seined.

Project Tailrace Channel

The Project tailrace channel was electrofished four times during the 2012 field season and 42 total fish were captured. The surveys occurred on August 21 according to the relicensing Study Plan, and three times (July 6, August 13, and August 24) due to maintenance on the Project and the subsequent dewatering of the tailrace. For purposes of simplicity in presentation, the data from the four surveys is compiled into one data-set (Figure 19).

Figure 19. Species composition survey Project tailrace.



The majority of fish captures occurred during the tailrace de-watering event on August 13 (20 of 42 total, or 48 percent). All captured fish were measured for fork length (nearest mm) prior to release (Table 12). It should be noted that one bull trout/brook trout hybrid which was initially captured and tagged during the August 13 de-watering event was subsequently recaptured in the tailrace during the August 24 de-watering event. All fish captured during tailrace de-watering events were released into the West Fork Wallowa River.

Table 12. Biological information of tailrace captured fishes.

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
rainbow trout	11	132	41.79	196
mountain whitefish	9	138	34.54	177
brook trout	4	132	13.88	148

bull trout	3	381	187.77	550
bull/brook hybrid	2	178	53.03	215
kokanee	4	205	9.12	215
sculpin	5	91	30.68	128

Fish labeled as bull trout/brook trout hybrids were confirmed by genetic analysis at the United States Fish and Wildlife Service's Abernathy Conservation Genetics Lab in August 2012.

2012 Bull Trout Surveys

Bull trout of sufficient fork length that were captured during seasonal electrofishing surveys from Section 3.0 of this Aquatic Study Report's field activities, as well as during bull trout collection efforts at the head of Wallowa Lake, were marked with half-duplex (HDX) PIT tags and then released. Tagged fish within the Project boundary were monitored using HDX PIT tag antenna arrays constructed within the EF Wallowa River natural channel and the Project tailrace.

Tangle nets consisting of dyed green 6# monofilament, with depths of approximately 2 meters (m), varying lengths of 25 – 40 m, and varying mesh sizes of 2.5 – 7.5 centimeter (cm) stretch were deployed with boats in Wallowa Lake in June and July to capture bull trout for tagging purposes. Nets were set and allowed to passively fish unattended for up to 1.5 hours. All captured bull trout entangled in nets were retrieved and placed in a live well. Opportunistic angling was also incorporated into the capture survey events.

Water Temperature

PacifiCorp collected water temperature data during WY 2012 and WY 2013 at the same five sites in the East Fork where flow data was collected (as discussed above). In addition, PacifiCorp collected water temperature data in the West Fork upstream of the Powerhouse tailrace (site WFI), and in the Wallowa River downstream of the East Fork and West Fork confluence (site WRC). The water temperature data shows that the highest mid-summer seven-day averages of the maximum daily temperature (7-DAD Max) for the study sites were 15.0°C, 14.2°C, 14.0°C, 13.4°C, 12.9°C, and 12.4°C, respectively, at sites WFI, WRC, BPL, RPI, EFI, and BPU (Figures 20 and 21). Of the five thermal classifications (i.e., cold, cold-cool, cool, cool-warm, and warm) for temperate streams in the U.S. and Canada developed by Chu et al. (2009), the coldest (i.e., "cold") classification includes locations that have daily maximum water temperatures of 15.9°C or less. Based on the data obtained in this study, all of the study sites fall within this "cold" classification.

Figure 20. 7-DAD Max water temperature values at sites WFI, EFI, and RPI.

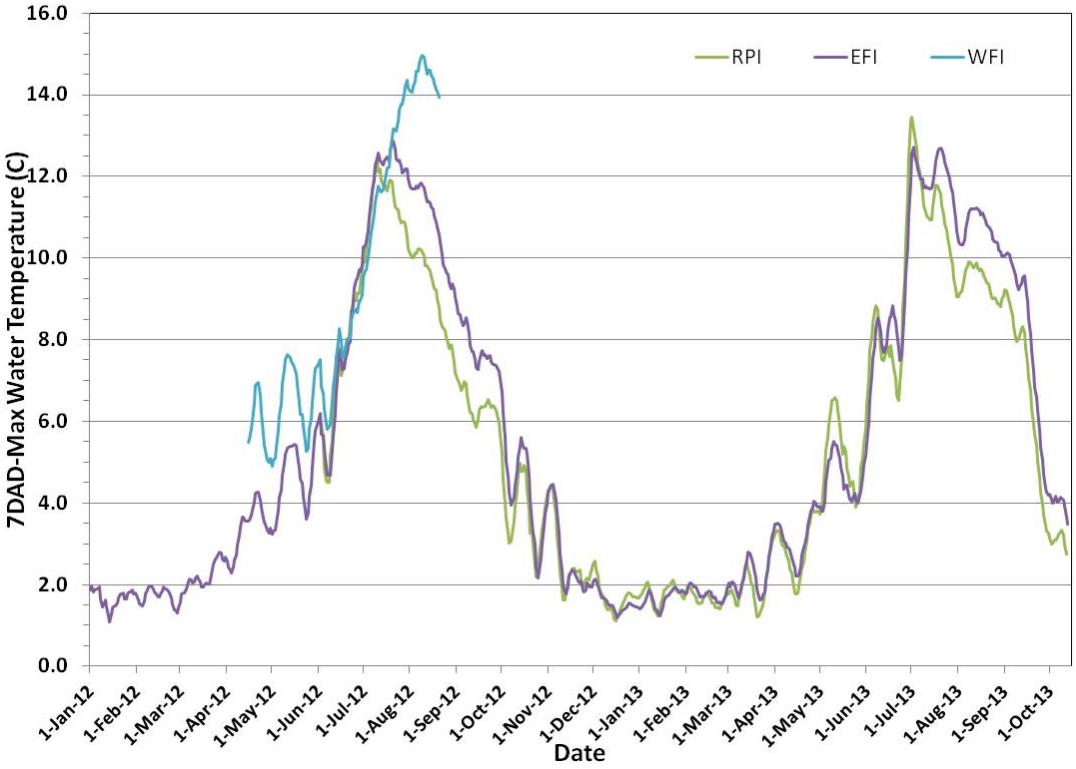
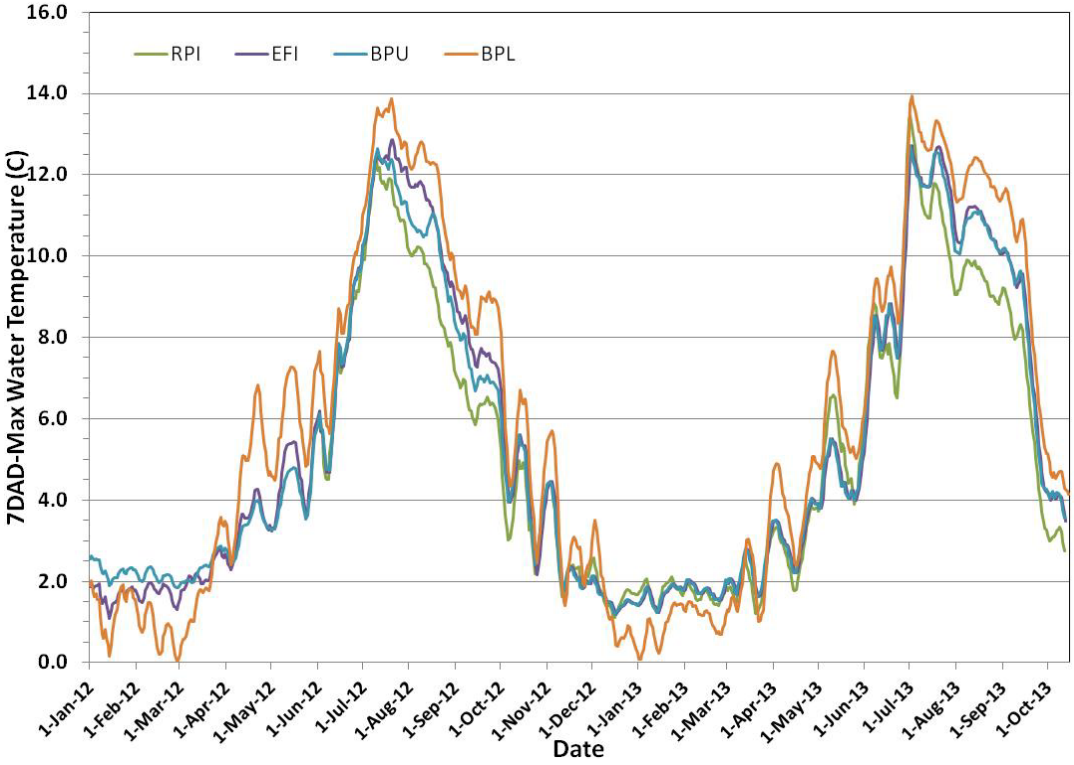


Figure 21. 7-DAD Max water temperature values at sites EFI, RPI, BPU, and BPL.



The State of Oregon water temperature standard indicates that streams identified as supporting use for bull trout spawning and juvenile rearing may not exceed 12°C based on the 7-DAD Max water temperature (OAR 340-041-0028). The observed 7-DAD Max water temperature values were less than (and therefore meet) the 12°C criteria throughout most of the year at all study sites. However, 7-DAD Max water temperature values exceeded 12°C for relatively short periods (about 2 to 4 weeks) in mid-summer at all sites.

Based on comparison of the East Fork and West Fork inflow sites (sites EFI and WFI), water temperatures in the East Fork are generally cooler than the West Fork during summer (Figure 20). The data suggest that the cooler water temperatures in the East Fork are the result of a smaller watershed area draining to the EFI site compared to the WFI site. The larger drainage area to the WFI has comparatively lower mean elevation, lower average gradient, greater stream width, and longer stream reach length in the West Fork, which are factors that act to cause a relatively higher rate of stream heating as waters flow downstream (Isaak and Hubert 2001).

The comparison of water temperature trends between the upper and lower sites in the East Fork bypassed reach (sites BPU and BPL) indicates that flows are consistently warmer at BPL from spring through summer (Figure 21). The progressive warming of flows as they travel downstream in the Project bypassed reach, particularly during summer, is reasonable to

expect given that the gradient of the reach drops from about 5,800 to 4,600 ft. in elevation between the two sites. Elevation is expected to have a direct effect on the rate of stream heating, particularly in mountain landscapes, because of the adiabatic lapse rate, which can result in heating of air temperatures by about 3.5°C per 1,000 feet (305 m) drop in elevation (Isaak and Hubert 2001). The additional reach length between sites (about 2 mi) also increases the time that flows can be exposed to solar radiation and air temperatures during the day.

All captured bull trout were measured to the caudal fork and a small 1 square centimeter (cm) tissue sample (as recommended by the USFWS Abernathy Conservation Genetics Lab standard protocol) was taken from the upper lobe of the caudal fin from each individual for future genetic analysis. Captured bull trout >120 mm and <300 mm in fork length, were tagged with a uniquely coded 13 mm HDX PIT tag in the dorsal sinus, while bull trout >300 mm fork length were tagged with a 23 mm HDX PIT tag, for identification in case of interrogation at any PIT antenna array. PIT tags were inserted, using a tagging syringe or scalpel, just anterior to the dorsal sinus with the tag being gently pushed toward the caudal peduncle.

To interrogate previously tagged bull trout that volitionally moved past PIT antenna arrays, stream-width HDX PIT tag antennae were placed at the mouth of both the Project tailrace channel and the East Fork Wallowa River natural channel. Antennas were specifically placed in shallow areas of each identified location. Per the manufacturer, 13 mm HDX PIT tags have a nominal read-range of 26 inches, while 23 mm tags exhibit a read-range of approximately 32 inches, making shallow stream areas more conducive to higher detection efficiencies. The higher water velocities of shallow riffles also facilitate better fish movement through the antenna array.

In order to determine directionality of fish movement, each PIT array consisted of two antennas multiplexed (synchronized) and spaced approximately two meters apart. Each antenna was comprised of a 10-gauge copper speaker wire looped along the stream bottom (flat-plate design). The loop started from one stream bank, spanned the entire wetted-width of the stream along the stream bottom to the opposite bank, and then looped back along the stream bottom to the original starting point creating a large flattened oval shape. Each 10-gauge copper speaker wire was then connected to an Oregon RFID® RI-Acc-008B antenna tuner unit. Copper twinax communication cable was then run from each tuner unit to an Oregon RFID® RI-RFM-008 reader board and data logger. Antennas were powered by three 12-volt deep-cycle marine batteries attached to each other in parallel; batteries supplied enough power for three weeks of operation.

The PIT antennas at the mouth of the Project tailrace and East Fork Wallowa River natural channel were constructed and powered up on July 12, 2012 (Figure 3.3.1). The East Fork Wallowa River natural channel PIT antenna was turned off and taken out of the stream on November 18, 2012. The Project tailrace channel antenna remained in operation longer and

will be removed from the stream on December 31, 2012. The East Fork Wallowa River natural channel antenna experienced no power loss and ran continuous throughout the study period (July 12 – November 18). Except for two days of power loss in September and three days of power loss in November, The Project tailrace antenna also ran continuous throughout the study time-period (July 12 – December 31).

Netting activities to collect bull trout from Wallowa Lake occurred during two time-periods, over a total of eight days, June 12-15, and July 3-6. Over this study time-period 43 distinct net sets were completed for a total of 62 hours net set time. The shortest soak during the study period was one hour and the longest time a net was allowed to fish was three hours; average set time was 1.5 hours. The bulk of netting locations generally focused within and around the confluence area of the West Fork Wallowa River and the lake. Nets were also set in strategic locations around the lake in an effort to locate holding bull trout.

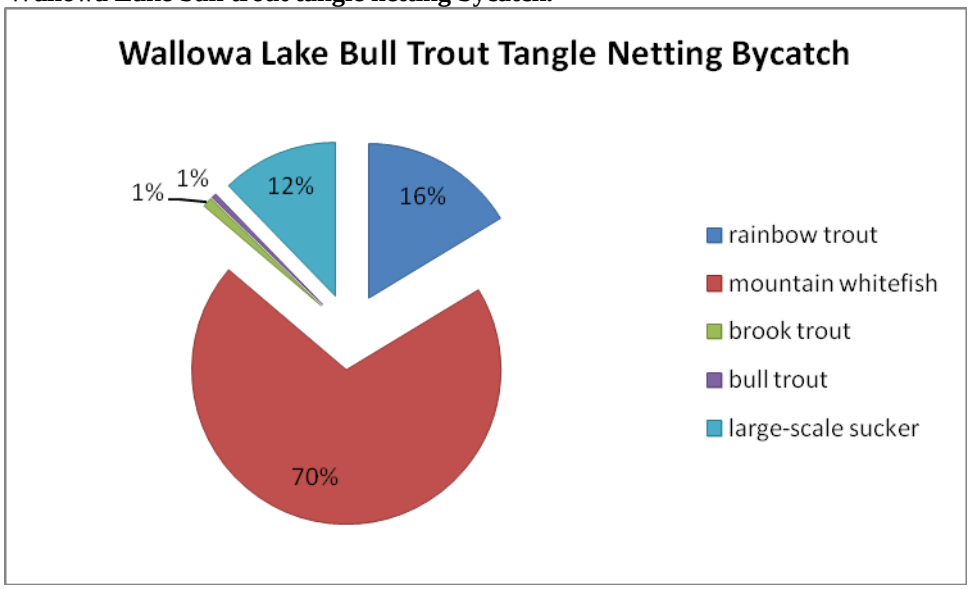
One bull trout was captured during the lake netting effort. The bull trout was captured in the West Fork Wallowa River confluence area on July 4 and measured 378 mm in fork length. After insertion of a PIT tag and sampling of genetic material, the bull trout was released at the point of capture.

Bycatch data from non-target species collected during netting efforts is illustrated in Table 13 and Figure 22.

Table 13. Bycatch data from non-target species collected during netting efforts.

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
rainbow trout	32	297	55.65	381
mountain whitefish	137	297	19.8	375
brook trout	2	n/a	n/a	319
bull trout	**1**	**n/a**	**n/a**	**378**
large-scale sucker	24	295	52.16	432

Figure 22. Wallowa Lake bull trout tangle netting bycatch.



Mountain whitefish were the most abundant species encountered. Given the dimensions of deployed nets and their orientation to the lake bottom, it is not surprising mountain whitefish were the most common species caught as they are strongly associated with the benthic region of large water bodies (Pontius and Parker 1973). Given methods identified, fish that typically reside higher in the water column (i.e. rainbow trout) would not be captured at the same rate as benthic oriented species (i.e. bull trout, mountain whitefish, and large-scale sucker, *Catostomus macrocheilus*).

During electrofishing surveys of the East Fork Wallowa River natural channel and dewatering events of the Project tailrace channel, 52 bull trout were captured. Of these 52, fifteen were of appropriate tagging size (>120 mm fork length) and were tagged with an HDX PIT tag (Table 14). The total number of HDX PIT tagged bull trout during 2012 activities was 16 fish.

All bull trout captured during 2012 activities were genotyped for species identification by the United States Fish and Wildlife Service's Abernathy Fish Conservation Genetics Lab.

Table 14. PIT tagged bull trout during 2012 field activities.

DATE	SPECIES	PIT#	FL (mm)	CAPTURE LOCATION	NOTES
7/4/2012	BT	A0F657C	378	Wallowa Lake	HDX 23mm tag, tangle net capture, genotyped
8/13/2012	BTxBRKT	591847	215	Tailrace	HDX 13mm, genotyped
8/13/2012	BT	58484B	179	Tailrace	HDX 13mm, genotyped
8/13/2012	BT	A0F65A8	415	Tailrace	HDX 23mm, female, genotyped

8/13/2012	BT	A89AF23	550	Tailrace	HDX 23mm, male, genotyped
8/23/2012	BTxBRKT	6594848	189	100-200m EFW bypass	HDX 13mm. genotyped
8/23/2012	BT	C582635	171	200-300m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C58942B	181	500-600m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C58803D	179	600-700m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C58063A	168	600-700m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C586E5C	191	700-800m EFW bypass	HDX 13mm. genotyped
8/24/2012	BTxBRKT	C58921A	151	700-800m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C58524D	155	800-900m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C58924A	245	800-900m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C589C51	169	800-900m EFW bypass	HDX 13mm. genotyped
8/24/2012	BT	C588A60	164	800-900m EFW bypass	HDX 13mm. genotyped

Of the 16 fish tagged during 2012 field activities, three were detected at one of the two fixed PIT tag antenna arrays. Of the three detected individuals, one was a bull trout/ brook trout hybrid and the two others were genotyped as pure bull trout. All three were captured and tagged from within the Project tailrace channel during an August 13, 2012 dewatering event and released into the West Fork Wallowa River. Detected fish are highlighted in yellow in Table 14 above.

The interrogated bull trout/brook trout hybrid was first detected moving past the fixed antenna at the mouth of the Project tailrace channel on September 18. This same fish was recorded moving upstream past the tailrace channel antenna and then back downstream on seven more occurrences, September 23, 24; October 15, 16, 19, 28; and November 3 The last known location of this fish was on November 8 as it moved upstream, past the upper-most tailrace antenna.

The other two interrogated bull trout were captured together within the Project tailrace, and after insertion of a PIT tag were released downstream into the West Fork Wallowa River. Upon visual inspection, the larger of the two fish (550 mm fork length) was identified as a male from the large kype (protruding lower jaw), large dorsal "hump", and vivid coloration. The smaller of the two fish (415 mm fork length) was identified in the field as a female from lack of a kype and a more stream-lined body shape. Coloration of the female was also more muted when compared to the male. After genetic analysis, both fish were genotyped as pure bull trout.

The male bull trout (tag #A89AF23) was detected moving upstream past the fixed PIT tag antenna array near the mouth of the East Fork Wallowa River natural channel on August 29. The female bull trout (tag #A0F65A8) that was initially captured and tagged with the male bull trout above, was detected moving upstream past the same fixed PIT tag antenna array in the East Fork Wallowa River natural channel just a few days later, on September 5. The

female was later detected on September 22 moving downstream and leaving the system. The male was detected a few days later on September 25 moving downstream also leaving the system. Neither bull trout were interrogated again after these detection events.

2013 Kokanee Surveys

To enumerate kokanee spawners in the West Fork Wallowa River, surveyors from the USFWS, ODFW, or PacifiCorp would start at the head of Wallowa Lake and count spawning and holding kokanee as they walked upstream. Surveys began August 24 and continued on a weekly basis through November 3, encompassing the entire spawn time-frame.

During each survey, kokanee counts were attempted in all three Reaches (Map 2.0-1) and the counts broken into two categories, spawners and holders. To be part of the spawner count, a kokanee was actively spawning or defending a redd. The holder count consisted of all other kokanee in the stream not associated with a redd during the time of the survey. The two distinct spawner and holder counts were utilized to establish a kokanee spawner residence time within the stream. The residence time represented how long a fish displayed holder behavior once entering the tributary. From the survey data, separate fish density curves (survey date fish count vs. time since first survey date) were generated for both holders and spawners. The time interval between the peaks of the holder and spawner fish density curve was taken as the residence time of holding fish. As expected, the peak of the holder curve occurred first.

Using AUC, a holder fish-density curve was generated (a data point for each survey date) in the form of total holding fish vs. time since first survey (in days). Upon the end of the spawning season the completed holder fish-density curve was numerically integrated by trapezoidal approximation to find the area under the curve. The area contained the units of *fish*days*. Taking consideration that a fraction of fish were counted multiple times between survey dates, the total area of the holder fish-density curve was divided by the observed holder residence time, resulting in a total spawn estimate (English et al, 1992).

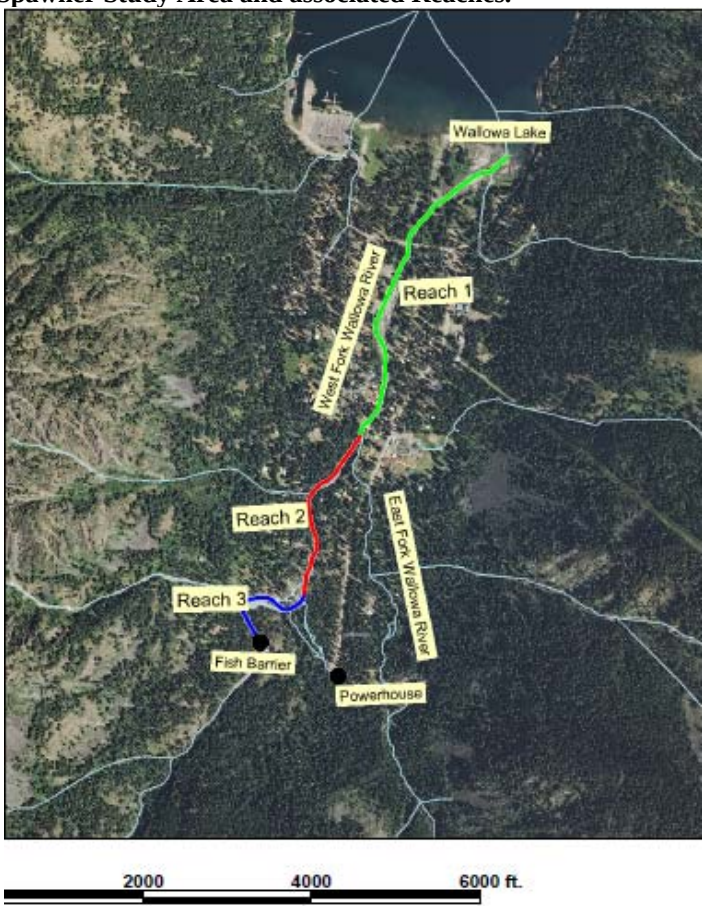
AUC methodology does not require equal time elapsed between surveying intervals, though short intervals between survey dates will provide more confidence in the estimation. Weekly surveys were performed to generate the holder residence time. It is important to minimize periods occurring between successive survey dates that are greater than the observed residence time. The closer counts are to zero fish during the first and last surveys, the more accurate the calculated AUC of the fish-density curve will be, thus enabling the fish-density curve to have closed ends and limiting the extrapolation needed to estimate the AUC (English et al, 1992).

Along with an AUC generated total spawner abundance estimate by reach, a peak spawner live count by reach was also quantified. Additionally, average kokanee fork length at spawn was assessed by sub-sampling recovered spawn spent kokanee carcasses during each survey.

24 male and 46 female carcasses were recovered and sampled over the entire spawn time-frame.

Two surveyors were employed during each kokanee spawner count. In order to standardize expected surveyor error with concern to fish counts, care was taken, though not always realized due to time and logistical constraints, to have the same surveyors perform each weekly survey.

Site map of Kokanee Spawner Study Area and associated Reaches.



The West Fork Wallowa River was surveyed for spawning kokanee on eight occurrences between August 24, 2013 and November 4, 2013. Conditions during each survey were favorable, with relatively good water clarity and seasonal low river levels. During each survey independent spawner and holder counts were conducted to evaluate fish residence time prior to spawn within each specified reach (Figure 23), as well as an overall peak season count (Figure 24).

Figure 23. West Fork Wallowa River Kokanee Counts – Spawner/Holder Curves

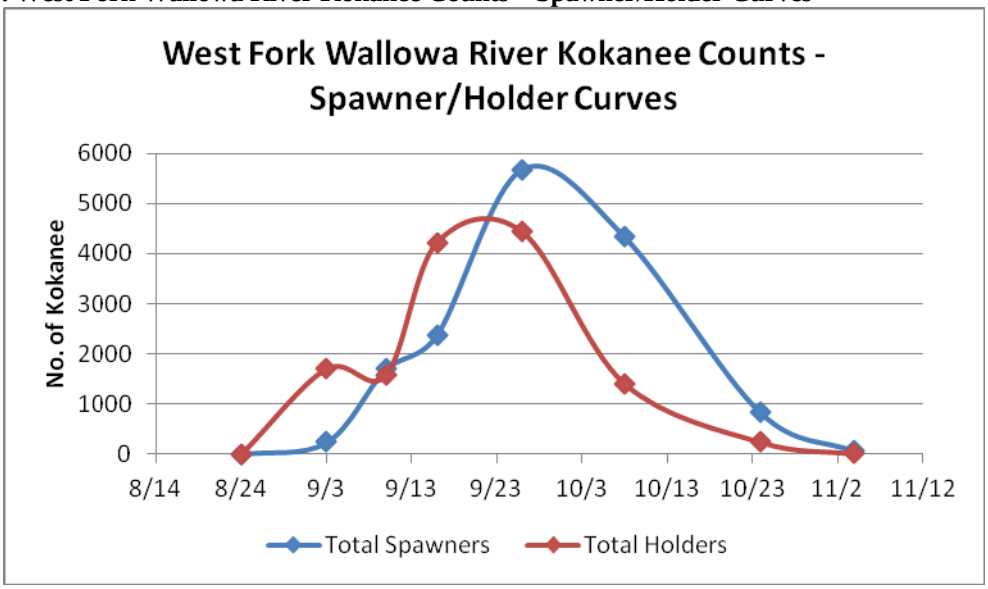
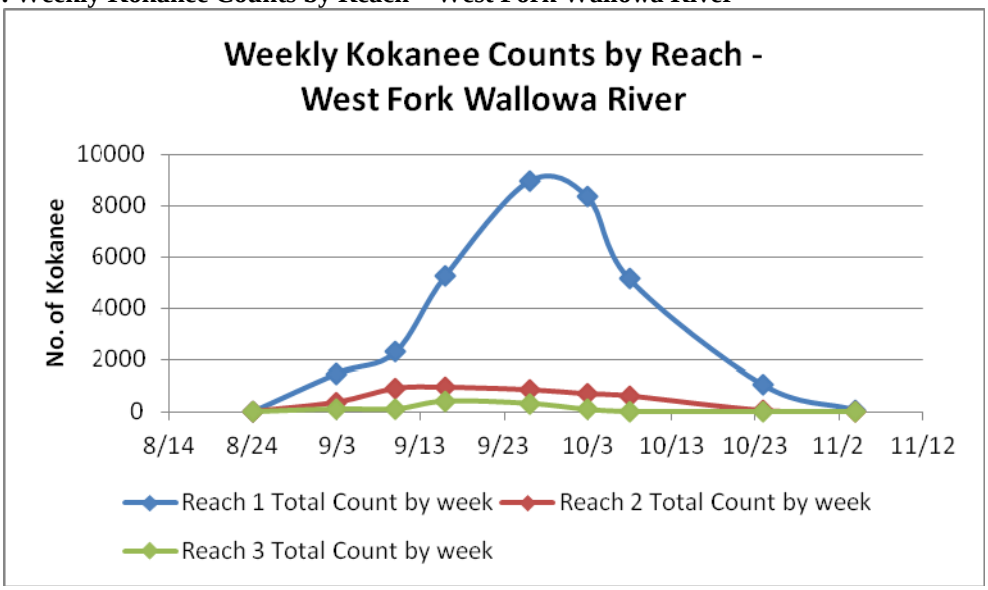


Figure 24. Weekly Kokanee Counts by Reach – West Fork Wallowa River



In order to generate a total estimate of kokanee spawners using Area Under the Curve, kokanee residence time (The time between the peak holder count and the peak spawner count) was required. The peak holder count was observed on September 21 with the peak spawner count following shortly thereafter on September 26, giving a residence time of five days. A peak kokanee count of 10,110 was observed on September 26, 2013. Area Under the Curve estimates of kokanee spawners by reach based on the holder curves illustrated in Figure 25 is expressed in Table 15.

Figure 25. West Fork Wallowa River Kokanee Count – Holder Curve by Reach

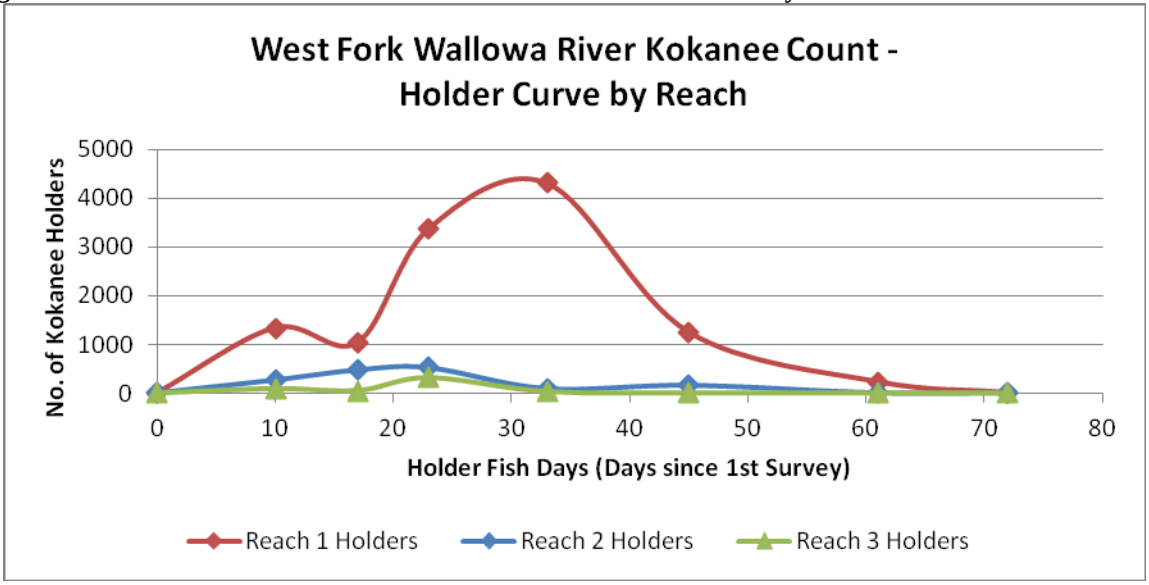


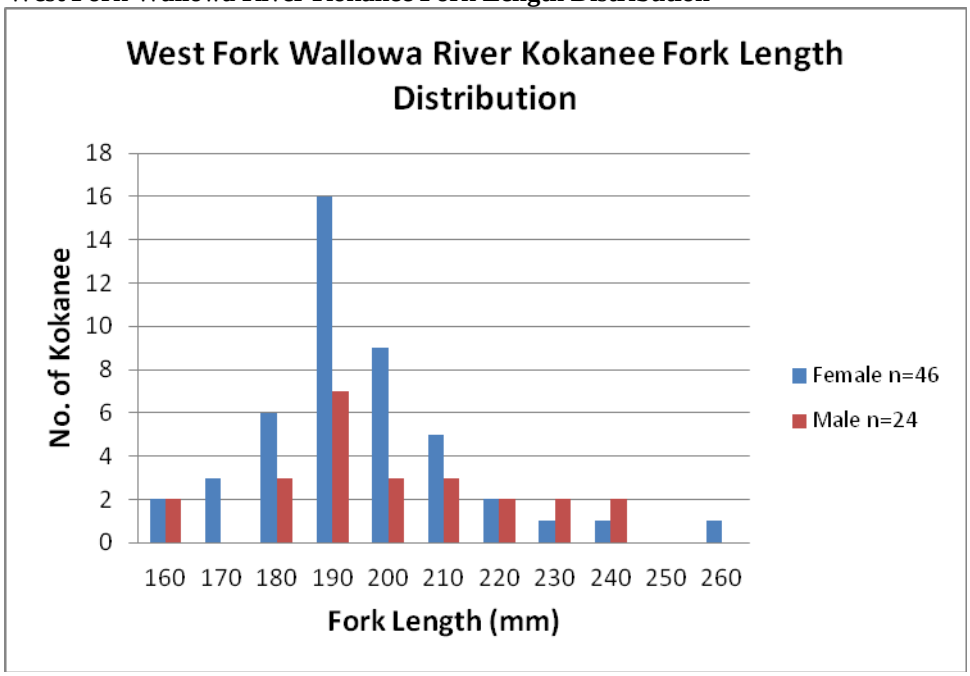
Table 15. Estimates of Spawning Kokanee by Reach using AUC

Estimates of Spawning Kokanee by Reach using AUC (trapezoidal approximation)	
Reach	Total Kokanee
1	**23,455**
2	**2,607**
3	**791**
Total	**27,128**

86 percent of the estimated total number of spawning kokanee within the West Fork Wallowa River in 2013 were counted within Reach 1, as compared to ten percent of the total in Reach 2 and four percent of the total in Reach 3.

During each survey, along with kokanee live counts, a portion of spawned-out kokanee carcasses were also measured in order to evaluate size at spawn. Both male and female kokanee were evaluated (Figure 26). 46 female and 24 male kokanee were measured. Average female fork length observed was 198mm with a standard deviation of 20.6mm. Males were observed to be slightly larger, having an average of 206mm fork length with a standard deviation of 25.6mm. The largest measured male was 280mm and the largest female 260mm.

Figure 26. West Fork Wallowa River Kokanee Fork Length Distribution



2013 Bull Trout Surveys

Bull trout of sufficient fork length that were captured during 2012 seasonal electrofishing surveys and collection efforts at the head of Wallowa Lake were marked with half-duplex (HDX) PIT tags and then released. A main goal of 2013 activities was the hopeful recapture of these previously tagged bull trout. To that end, the East Fork Wallowa bypassed reach and the Wallowa Falls Project tailrace were again electrofished in August and all captured bull trout were interrogated for PIT tag presence. Previously tagged bull trout were also again monitored in 2013 using HDX stream-spanning PIT tag antenna arrays constructed within the EF Wallowa River bypassed reach and the Project tailrace.

The August electrofishing survey of the East Fork Wallowa bypassed reach started at the highway bridge and proceeded upstream to the anadromous fish barrier using single-pass electrofishing methods. Electrofishing activities within the Project tailrace occurred during de-watering for annual maintenance and consisted of multiple pass methods as the tailrace water receded until all fish were rescued and the channel was dry. All electrofishing activities followed protocols as set forth in the National Marine Fisheries Service Backpack Electrofishing Guidelines (NMFS 2000). A Smith-Root® model LR-24 backpack electrofisher was used during surveys and was set to un-pulsed direct current (DC) at the lowest possible setting to still allow capture of fish.

All captured bull trout were measured to the caudal fork, interrogated for PIT tag presence and sampled for genetic material by means of a small fin-clip from the upper lobe of the

caudal fin. All maiden captured bull trout >120 mm and <300 mm in fork length, were tagged with a uniquely coded 13 mm HDX PIT tag in the dorsal sinus, while bull trout >300 mm fork length were tagged with a 23 mm HDX PIT tag. PIT tags allowed for individual fish identification in case of interrogation at any remote PIT antenna array. PIT tags were inserted, using a tagging syringe or scalpel, just anterior to the dorsal sinus with the tag being gently pushed into the sinus toward the caudal peduncle.

During 2013 electrofishing surveys of the East Fork Wallowa River bypassed reach and dewatering events of the Project tailrace channel, 68 bull trout were captured. Three of the 68 were found to contain a PIT tag inserted during 2012 activities. In addition to the three recaptures, eight of the 68 bull trout encountered were maiden captures and of appropriate tagging size (>120 mm fork length) and were tagged with an HDX PIT tag. To date, 25 bull trout have been tagged with an HDX PIT tag (Table 19).

Table 16 and 17 illustrate bull trout fork lengths encountered during 2013 surveys as compared to bull trout encountered during 2012 surveys of the same area.

Table 16. Size data comparison between 2012 and 2013 bull trout captures from the East Fork Wallowa River bypassed reach electrofishing surveys.

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
Bull trout & hybrids – 2012	47	113	44.46	245
Bull trout & hybrids– 2013	56	111	73.14	480

Table 17. Size data comparison between 2012 and 2013 bull trout captures from the Project tailrace electrofishing surveys.

SPECIES	Sample Size	MEAN LENGTH (mm)	STANDARD DEVIATION	MAXIMUM LENGTH
Bull trout & hybrids – 2012	5	300	175.49	550
Bull trout & hybrids – 2013	12	232	92.12	440

PIT antennas at the mouth of the Project tailrace and East Fork Wallowa River bypassed reach were constructed and powered up on August 16, 2013. The East Fork Wallowa River bypassed reach PIT antenna was turned off and taken out of the stream on November 3, 2013. The Project tailrace channel antenna was taken off-line on August 26, 2013. The short study duration for the Project tailrace antenna was due to the channel de-watering on August 26 and remaining de-watered until September 27 at which time a barrier weir was constructed at the mouth of the channel to prohibit fish from entering. This weir was kept in place during the entire bull trout study period. The East Fork Wallowa River bypassed reach antenna experienced no power loss and ran continuous throughout the study period (August

16 – November 3). The Project tailrace antenna also ran continuous during its study time-frame (August 16 – August 26).

Of the 25 bull trout tagged during 2012 and 2013 field activities, six were detected at one of the two fixed PIT tag antenna arrays.

Five bull trout were interrogated moving upstream past the antenna at the mouth of the East Fork Wallowa bypassed reach. Four of the five detected bull trout were captured and tagged during 2013 activities, of special note was the upstream interrogation of a bull trout captured and tagged from the upper bypassed reach in 2012 (Table 18).

Table 18. Bull trout interrogations at the East Fork Wallowa River bypassed reach PIT antenna.

PIT #	Capture Year & Location	FL @ capture	PIT Antenna Transit Times
C58803D	2012 - 600-700m EFW bypassed reach	179	8/27 @A2, downstream
AC35675	2013 - Project tailrace	440	8/30 @A2, upstream 9/18 @A4 and A2 downstream
C587230	2013 - Project tailrace	227	9/3 @A2, upstream
AC35672	2013 - 800-900m EFW bypassed reach	480	9/11 @A2, upstream
C583A3C	2013 - Project tailrace	246	10/13 @A4, upstream

Only one bull trout was interrogated at the Project tailrace antenna during its ten day operation window. This bull trout was initially captured and tagged within BC Creek, approximately 250 meters upstream. BC Creek is a small tributary of the West Fork Wallowa River which is located upstream from the confluence of the Project tailrace channel with the West Fork Wallowa River (Table 19).

Table 19. Bull trout interrogations at the Project tailrace PIT antenna.

PIT #	Capture Year & Location	FL @ capture	PIT Antenna Transit Times
6586847	2012 - BC Creek	170	8/19 - 8/21 @A2

No previously tagged bull trout were encountered during the August 2013 electrofishing survey of the East Fork Wallowa bypassed reach. All handled recaptures (3) were encountered in the Project tailrace during the August maintenance de-watering event. Of specific interest concerning the tailrace recaptures, was the recapture of previously captured and tagged bull trout from the upper East Fork Wallowa bypassed reach in 2012. Along with these three handled recaptures, two additional bull trout captured and tagged during 2012 activities were also interrogated moving past passive PIT antenna sites in 2013 (Table 20).

Table 20. Bull trout recaptures in 2013.

PIT #	FL @ Initial Capture	FL @ Recap	2012 Capture Location	2013 Recap Location	Comments
591847	215	255	Project tailrace	Project tailrace	40mm growth
C586E5C	191	237	700-800m EFW bypassed reach	Project tailrace	46mm growth
658484B	179	234	700-800m EFW bypassed reach	Project tailrace	55mm growth
C58803D	179	unknown	600-700m EFW bypassed reach	EFW PIT antenna	
6586847	170	unknown	BC Creek	Project tailrace PIT antenna	

To date, maiden bull trout captures from 2013 activities have not been genotyped. It is anticipated this action will occur in early 2014. All bull trout captured during 2012 activities were genotyped for species identification by the United States Fish and Wildlife Service's Abernathy Fish Conservation Genetics Lab.

Table 21. PIT tagged bull trout during 2012 and 2013 field activities.

DATE	SPECIES	PIT#	FL (mm)	CAPTURE LOCATION	NOTES
7/4/2012	BT	A0F657C	378	Wallowa Lake	HDX 23mm tag, tangle net capture, genotyped
8/13/2012	BTxBRKT	591847	215	Project tailrace	HDX 13mm, genotyped
8/13/2012	BT	58484B	179	Project tailrace	HDX 13mm, genotyped
8/13/2012	BT	A0F65A8	415	Project tailrace	HDX 23mm, female, genotyped
8/13/2012	BT	A89AF23	550	Project tailrace	HDX 23mm, male, genotyped
8/23/2012	BTxBRKT	6594848	189	100-200m EFW bypassed reach	HDX 13mm. genotyped
8/23/2012	BT	C582635	171	200-300m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C58942B	181	500-600m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C58803D	179	600-700m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C58063A	168	600-700m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C586E5C	191	700-800m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BTxBRKT	C58921A	151	700-800m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C58524D	155	800-900m EFW bypassed reach	HDX 13mm. genotyped

8/24/2012	BT	C58924A	245	800-900m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C589C51	169	800-900m EFW bypassed reach	HDX 13mm. genotyped
8/24/2012	BT	C588A60	164	800-900m EFW bypassed reach	HDX 13mm. genotyped
7/6/2012	BT	6586847	170	BC Creek	HDX 13mm. genotyped
8/15/2013	Field ID BT	C585E61	209	EFW bypassed reach	HDX 13mm
8/15/2013	Field ID BT	C58083A	208	EFW bypassed reach	HDX 13mm
8/15/2013	Field ID BT	AC35672	480	EFW bypassed reach	HDX 23mm
8/15/2013	Field ID BT	AC35679	330	EFW bypassed reach	HDX 23mm
8/26/2013	Field ID BT	AC3567A	365	Project tailrace	HDX 23mm
8/26/2013	Field ID BT	AC35675	440	Project tailrace	HDX 23mm
8/26/2013	Field ID BT	C587230	227	Project tailrace	HDX 13mm
8/26/2013	Field ID BT	C583A3C	246	Project tailrace	HDX 13mm

Aquatic Invertebrate Community in the Project Area

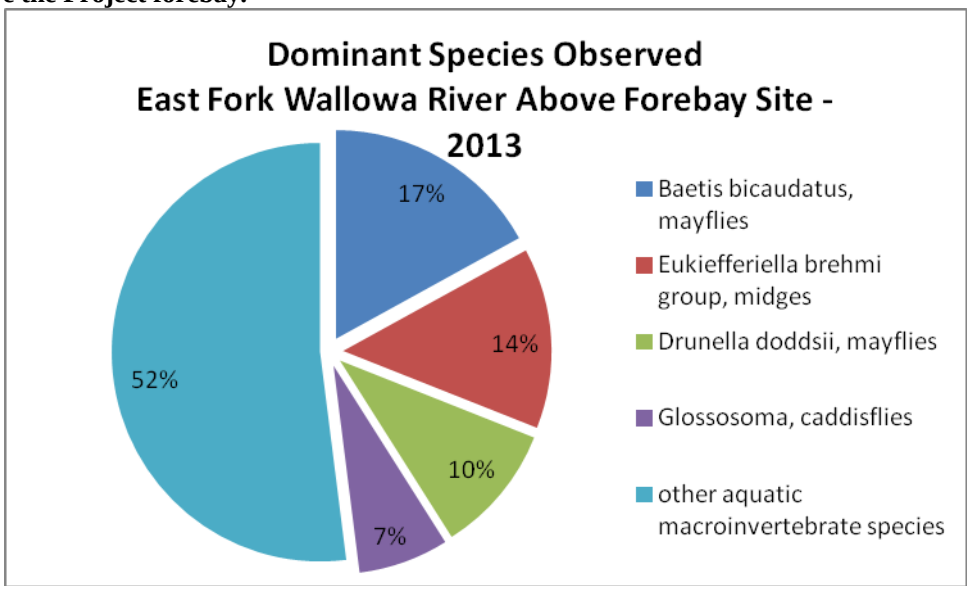
Benthic macroinvertebrate samples were obtained in the East Fork bypassed reach in summer 2012 and again in summer 2013. Analysis of the 2012 and 2013 samples were completed, and the results provide insights into the composition of the macroinvertebrate community in the Project area.

Analysis of the 2012 and 2013 samples indicate that the macroinvertebrate community in the Project area consists of a diverse assemblage of aquatic insects, including a variety of mayflies (*Ephemeroptera*), stoneflies (*Plecoptera*), caddisflies (*Trichoptera*), and midges (*Chironomidae*). Many of the taxa observed in the samples are cold-water species typical in Pacific Northwest mountain streams and indicative of good water quality and diverse habitat (substrate) conditions. Some taxa were present in samples from the lower end of the bypassed reach that are tolerant of (and therefore indicative of) fine sediment substrate accumulation. For example, *Oligochaeta* (segmented worms) abundance was moderate to high in these samples. Oligochaetes are most often associated with fine sediment.

During collection of the macroinvertebrate sample from the upper East Fork Wallowa River bypassed reach above the Project forebay on August 12, the Project forebay itself was also surveyed for fish presence. Using snorkel survey techniques, the entire forebay was surveyed. Three brook trout parr were observed. These fish were most likely out-migrants from Aneroid Lake upstream of the forebay.

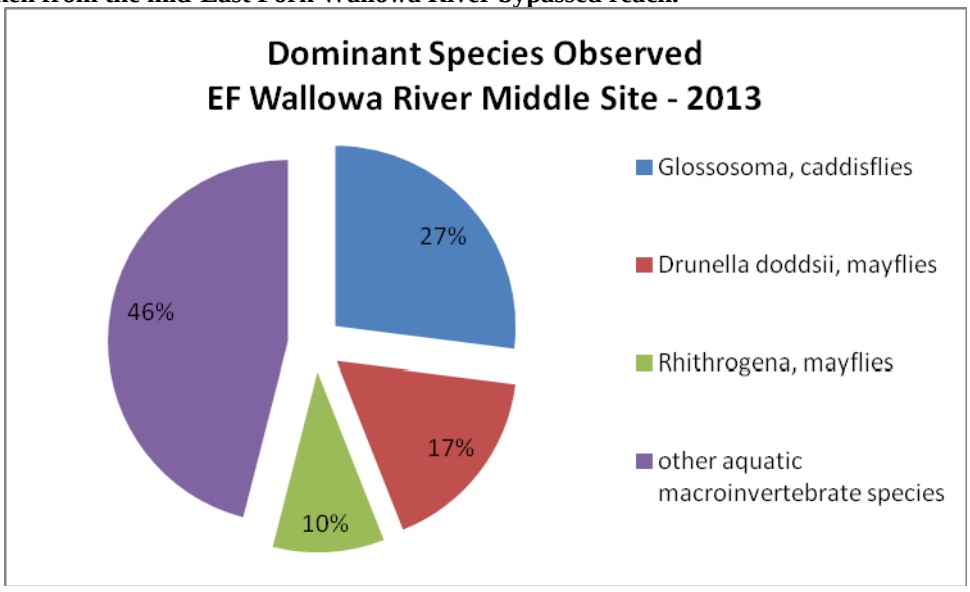
The sample taken from the East Fork Wallowa River above the Project forebay in 2013 was dominated by Ephemeroptera (mayflies), Chironomidae (midges), and Trichoptera (caddisflies) with the four most prevalent species expressed in Figure 27. In all, 41 different aquatic macroinvertebrate species were identified and enumerated from this sample.

Figure 27. The three most dominant aquatic macroinvertebrate species observed within the sample taken from above the Project forebay.



The sample taken from the East Fork Wallowa River natural channel in the identified 500 m stream section during 2013 data collection activities was dominated by mayflies and caddisflies. In all 50 different species were identified from within this sample. The three most dominant species observed are identified within Figure 28.

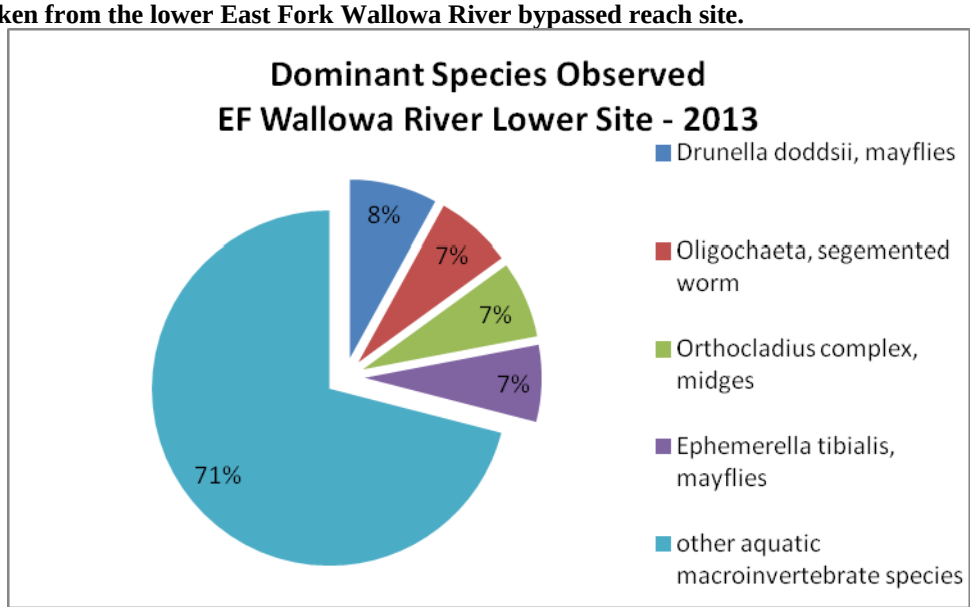
Figure 28. The three most dominant aquatic macroinvertebrate species observed in 2013 within the sample taken from the mid-East Fork Wallowa River bypassed reach.



The sample taken from the lower East Fork Wallowa River natural channel was dominated by mayflies, midges, and Oligochaeta (segmented worms). In all 57 different species were

identified from within this sample. The most dominant species observed are identified within Figure 29.

Figure 29. The three most dominant aquatic macroinvertebrate species observed in 2013 within the sample taken from the lower East Fork Wallowa River bypassed reach site.



For additional information regarding further methods and results concerning abundance as well as distribution of aquatic fish and macroinvertebrate species residing in and around the Project area, please refer to the 2012 and 2013 Aquatic Resources Study Reports which were filed with FERC on January 2, 2013 and January 3, 2014 respectively.

3.3.3.1 Environmental Effects

This section describes effects on aquatic resources of PacifiCorp's proposed facilities, operations, and environmental measures (as described in Section 2.2). These effects are determined on the basis of changes from current conditions (baseline) as described in the Affected Environment section above. The discussion of effects in this section is divided under subheadings associated with the specific proposed facilities, operations, and environmental measures as they pertain to aquatic resource issues.

Effects of Proposed Project on US Forest Service Management Indicator Species

The USFS has identified Management Indicator Species (MIS) as indicators for suitability of a habitat type and changes in their population may indicate effects of management or other species that share similar habitat requirements. The only aquatic MIS identified as having potential to occur in the Project boundary is rainbow trout (Oncorhynchus mykiss). PacifiCorp is not currently proposing any modification to aquatic habitat within the Wallowa-Whitman National Forest boundary. The lower portion of the bypassed reach

where aquatic habitat modifications are proposed lacks connectivity with suitable habitat with the WWNF boundary. Therefore, the proposed Project would have no effects to MIS within the WWNF.

Effects of Construction of Proposed Project Facilities and Implementation of Associate Best Management Practices (BMPs)

As described in Section 2.2.1, the proposed tailrace reroute facilities construction would include a new intake structure near the existing Powerhouse tailrace, a new buried conveyance pipeline (consisting of a 30-inch (76.2 cm) diameter, 1,000-foot (305 m) long pipe), and a reinforced concrete outfall structure that would discharge powerhouse flows back to the East Fork Wallowa River. As described in Section 2.2.3, PacifiCorp would implement a number of BMPs for erosion, sediment, spill prevention and control, and fish protection during the construction activities. There would be substrate and water quality effects from the construction of the proposed tailrace facilities. These effects are discussed in Section 3.3.1, Geology, Sediment and Substrate and Section 3.3.2 Water Resources, respectively. Measures specific to fish protection are summarized below:

- PacifiCorp shall ensure that any fill materials that are placed for the proposed habitat improvements in any water of the state do not contain toxic materials in toxic amounts.

- Work areas behind temporary cofferdams or isolated work areas below the OHWM will be dewatered with pumps. All pumped water will be discharged to unsaturated upland vegetated areas for infiltration

- All water intakes used for a construction project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated, and maintained according to National Marine Fisheries Service (NMFS) fish screen criteria.

- Before and intermittently during pumping to isolate an in-water work area, fish salvage will be conducted in the in-water work area. Fish will be captured from the in-water work area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury. Fish will then be released to a nearby unaffected stream area. The entire capture and release operation will be conducted or supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA listed fish. The work will comply with the requirements in the U.S. Fish and Wildlife Service (USFWS) biological opinion issued with the new license and PacifiCorp's State Scientific Collection Permit issued by Oregon Department of Fish and Wildlife (ODFW).

These measures, along with best management practices for erosion control, spill prevention and water quality protection measures are expected to mitigate any potential short-term or long-term adverse effects to fish species and habitat.

Interim Operations

PacifiCorp will continue to operate the Project with the current tailrace configuration until June following the third anniversary of FERC license issuance. During this time, PacifiCorp will design, permit and construct the proposed tailrace reroute pipeline project. PacifiCorp plans to construct the tailrace reroute pipeline and associated intake and outfall structures between June and September of the third year following license issuance. However, to minimize effects to water quality and aquatic species, the pipeline will not be put into operation until the following seasonal high-flow period (June) after construction is completed.

During the three-year interim operations period, when the current tailrace configuration will be used, PacifiCorp will continue to conduct a fish salvage of all tailrace channels anytime there is a planned or unplanned dewatering of the tailrace. As described in Section 2.1.3, there are limited operational scenarios under which the tailrace channels become completely dewatered. To further protect bull trout and kokanee during the interim period, a fish exclusion weir will be installed annually prior to September 1 at the confluence of the tailrace with the West Fork Wallowa River to prevent fish spawning in the tailrace channels. The fish exclusion weir will be left in place through November 15 and will be monitored twice per week for the duration of the installation period to assure performance. In the event that a fish exclusion weir is not installed in a given year, the tailrace channels will be dewatered and the powerhouse not operated between September 1 and November 15 to prevent fish spawning in the tailrace channels. Prior to any shutdown, a fish salvage of the tailrace channels will be conducted.

Effects of Proposed Project Operation with Modified Instream Flow Releases

As described in Section 2.2.2, the Project would continue to be operated in run-of-river mode during all times of generation (i.e., the Powerhouse return flows are not subject to storage and would fluctuate naturally according to East Fork inflow conditions). The automated control system equipment would be set to divert no more than PacifiCorp's water right of 16 cfs, from the East Fork Wallowa River. PacifiCorp proposes increased instream flow releases in the East Fork bypassed reach, consisting of: (1) a year-around flow of 4 cfs as measured at the proposed compliance gage location; and (2) rerouting of the powerhouse tailrace so that all powerhouse flows are returned to the East Fork bypassed reach. The goal of this measure is to manage flows in the East Fork bypassed reach in a manner that provides habitat suitable for the production of healthy and sustainable fish populations and eliminates the potential to strand ESA listed bull trout in the current tailrace, while continuing to maintain PacifiCorp's ability to generate hydroelectric power.

Under Article 401 of the current license, PacifiCorp is required to maintain a minimum flow of 0.5 cfs in the bypassed reach. To insure continuous compliance with the existing minimum flow provision of 0.5 cfs, PacifiCorp typically releases an additional discharge of 0.3 cfs. Accordingly, the actual minimum instream flow released may range between 0.5 and 0.8 cfs largely depending on season.

As part of the two-fold instream flow proposal to enhance fish resources in the bypassed reach, PacifiCorp would release an increased, year-round minimum flow of 4 cfs as measured at the proposed compliance gage location described in Section 2.2.1. The increased minimum flow release of 4 cfs would substantially increase the availability and usability of aquatic habitat in the bypassed reach over the current 0.8 cfs minimum flow release. This is particularly the case for the portion of the bypassed reach between the natural fish barrier (falls) and the location where the proposed rerouted tailrace would discharge into the bypassed reach. This length represents a third of the accessible habitat within the bypassed reach, or approximately 1,500 feet (457 m). As explained further later in this section, the tailrace reroute would further increase the amount of aquatic habitat available in the bypassed reach below the new discharge location by restoring the natural hydrology to the lower 2,600-foot (793 m) portion of the reach.

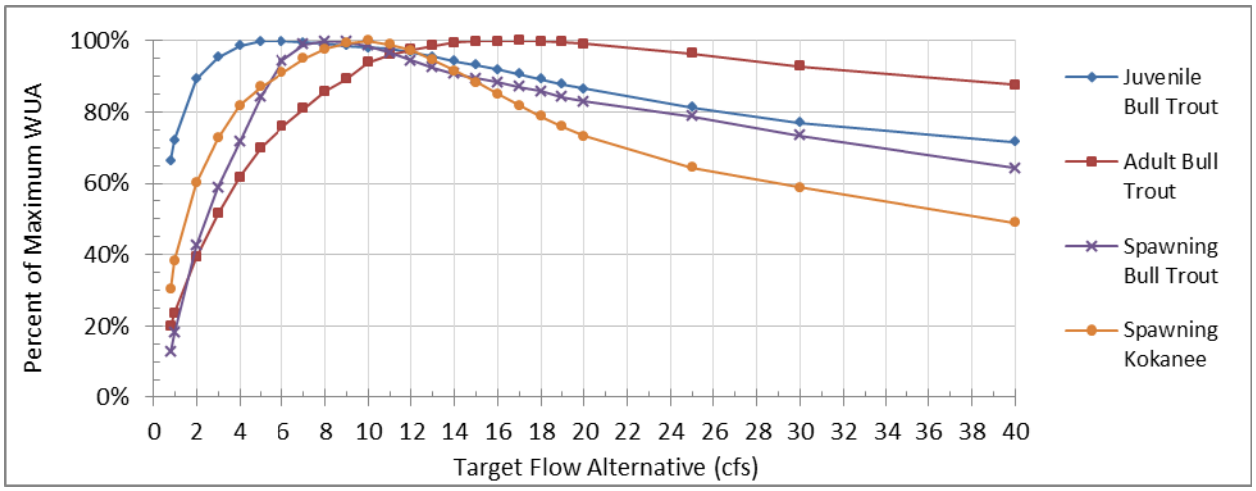
PacifiCorp performed an IFIM study in 2012 to evaluate the effects of various minimum flows on habitat in the East Fork bypassed reach for adult, juvenile, and spawning bull trout, as well as spawning kokanee. The study reach was limited to the lowest 1,600 feet (488 m) of the bypassed reach, where stream conditions met the fundamental assumptions of the computer model used to simulate habitat. No water velocity, habitat data or IFIM transects were assessed in the upper-habitat portion of the bypassed reach above the proposed tailrace reroute pipe outlet due to the turbulence caused by the steep gradient (8.5 percent), confined channel, and geomorphology of the streambed in this section.

A detailed discussion of the IFIM study methodology is provided in the Wallowa Falls Habitat Modeling Results Preliminary Report (PacifiCorp 2013i). As described above, the current minimum instream flow released into the bypassed reach at the dam may range from 0.5 to 0.8 cfs, dependent upon season. During winter months, icing and low inflow to the forebay may result in flows of less than 0.8 cfs in the bypassed reach. During the summer and fall (June through November) at least 0.8 cfs is released into the bypassed reach. For this reason, the IFIM study used 0.8 cfs as the baseline for analysis. Three types of analyses of the model results are discussed in the sections below, including: (1) habitat-flow relationships for the target lifestages; (2) a habitat duration analysis showing expected habitat changes under actual operational flow conditions; and (3) the wetted perimeter-flow relationships in the East Fork bypassed reach at the IFIM study site.

Habitat-Flow Relationships

The relationships between habitat and flow for the target lifestages are displayed in Figure 30. Habitat is expressed as weighted usable area (WUA), and is calculated as square feet per 1000 feet. Although the shapes of the WUA curves vary by lifestage, in general each curve indicates that the greatest proportional gain in habitat occurs as flows increase from 0.8 cfs to 4 cfs. Peak WUA values occur at 5 cfs to 6 cfs for juvenile bull trout, 8 cfs for spawning bull trout, 10 cfs for spawning kokanee, and 18 to 19 cfs for adult bull trout.

Figure 30. Normalized (% of maximum) WUA curve for all target species and life stages of fish in East Fork Wallowa bypassed reach.



Habitat Duration Analysis

The WUA curves shown in Figure 30 provide an illustration of how habitat changes with flow, but they do not incorporate the actual range of flows that are known to occur in the bypassed reach. To help support a minimum flow decision, a habitat duration analysis of WUA was performed, in which the WUA curves were applied to the historical flow record and synthesized alternatives based on the record. The final product of the habitat duration analysis was a single, monthly value of WUA for each species/lifestage between May and October (wetted perimeter was used to analyze habitat between November and April). These values are referred to as total WUA. Selected total WUA results are discussed below, including for the actual monthly flow conditions (hydrographs) that would occur in the bypassed reach under: (1) the existing baseline of 0.8 cfs; (2) the applicant's proposed minimum flow of 4 cfs; and (3) the applicant's proposed tailrace reroute.

Existing Conditions and Predicted Changes

Under the existing minimum flow regime of 0.8 cfs, high flows during May through June contribute to high levels of total WUA for both adult and juvenile bull trout. However, as flows fall between August and October, total WUA decreases sharply for adult bull trout

Error! Reference source not found.31), and declines moderately for juvenile bull trout (Figure 32). The 4 cfs minimum flow alternative is predicted to provide increased total WUA for adult and juvenile bull trout almost every month. The tailrace reroute option provides minimal or no increase over existing total WUA for adult and juvenile bull trout during the spring runoff months. However, the reroute furnishes total WUA increases for both life stages during the low-flow months of August through October.

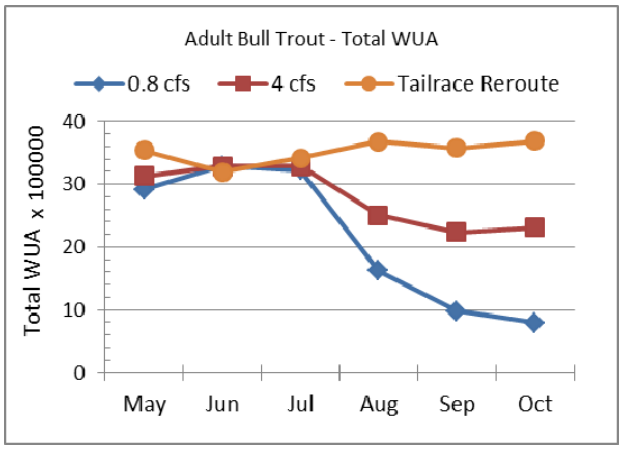


Figure 31. Total WUA provided by selected flow alternatives for adult bull trout.

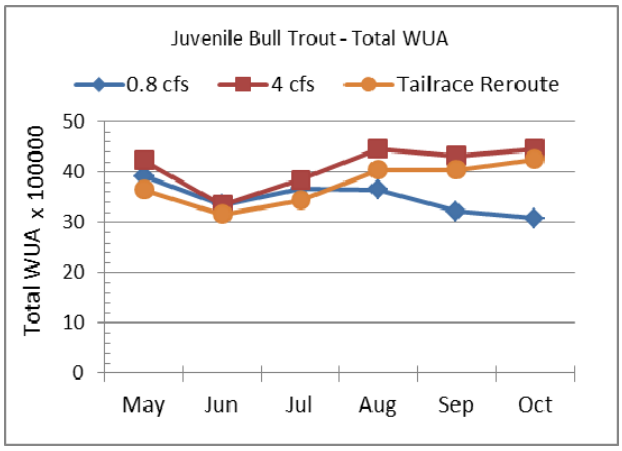


Figure 32. Total WUA provided by selected flow alternatives for juvenile bull trout.

Under the existing minimum flow regime of 0.8 cfs, total WUA is relatively low during the bull trout spawning months of September and October (**Error! Reference source not found.**Figure 33). Total WUA is greater for spawning kokanee, but exhibits a steep declining trend as natural flows drop between August and October (Figure 34**Error! Reference source not found.**). The 4 cfs minimum flow alternative and the tailrace reroute are expected to: (1) provide substantial increases in spawning habitat (note that only the tailrace reroute scenario affects kokanee spawning habitat); and (2) change the habitat trend over the spawning period from declining total WUA levels to increasing levels.

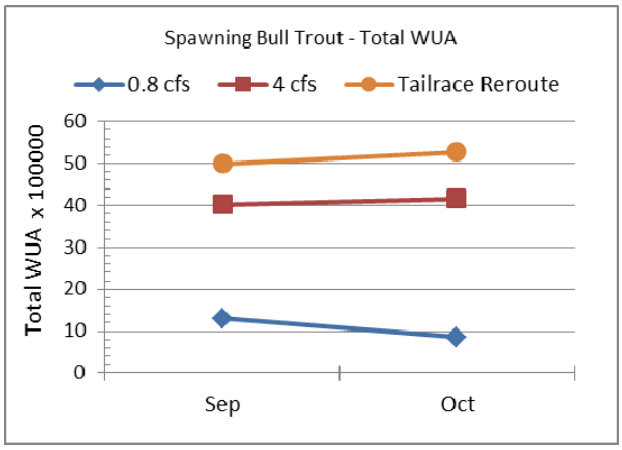


Figure 33. Total WUA provided by selected flow alternatives for spawning bull trout.

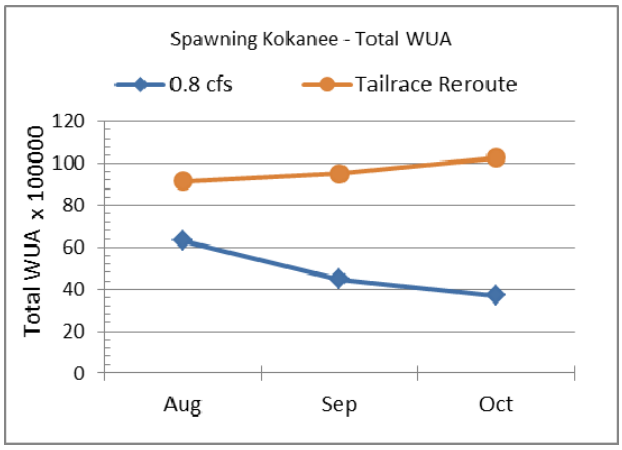


Figure 34. Total WUA provided by selected flow alternatives for spawning kokanee.

Analysis of Alternatives 4 cfs and 5 cfs

The proposed minimum flow of 4 cfs would affect only bull trout habitat. The degree to which existing total WUA levels could be improved is quantified in Table 25. The effects of the proposed minimum flow increase on adult and juvenile bull trout are relatively small in May, June and July when natural flows are high due to snowmelt runoff conditions. Habitat improvement for these lifestages is most pronounced during the low-flow period of August through October. Habitat for spawning bull trout is predicted to increase substantially under a minimum flow of 4 cfs. However, the results of a habitat survey performed by PacifiCorp indicate that a lack of suitable spawning substrate, rather than the combination of flows and depths that comprises total WUA, may be the limiting factor for bull trout spawning habitat. For this reason, it is difficult to quantify the benefits that a 4 cfs minimum flow will provide to spawning habitat.

Table 22. Percent increase over baseline habitat for bull trout provided by 4 cfs.

Month	Adult bull trout	Juvenile bull trout	Spawning bull trout
May	7%	8%	--
June	0%	0%	--
July	2%	5%	--
August	55%	22%	--
September	129%	34%	210%
October	191%	45%	389%

As a result of the steep gradient, confined channel, and abundance of exposed bedrock, it is expected that instream flow increases above 4 cfs would not substantially increase wetted width (i.e. increase habitat), but would simply increase water turbulence and velocity (and, to a lesser degree, depth). The increase in turbulence and velocity might even decrease usable habitat in

the upper portion of the bypassed reach. Given present habitat characteristics, more water does not necessarily equate to more habitat.

Analysis of 4 cfs in the Upper-Habitat Portion of the Bypassed Reach

The results of the IFIM modeling of the lower-habitat portion of the bypassed reach indicate that, compared to baseline conditions, a minimum instream flow of 4 cfs would enhance the availability of usable habitat in the lower reach for all life-stages of bull trout. The IFIM modeling results are not directly transferable to the upper portion of the bypassed reach given the differing (e.g., higher-gradient) hydraulic habitat conditions. However, it is assumed that an instream flow release of 4 cfs, identified as providing instream habitat enhancement in the lower-habitat portion of the bypassed reach, would also provide enhanced conditions in the higher-gradient upper-habitat portion of the bypassed reach. This assumption is based on professional judgment that, due to steeper gradient and confined channel, the velocities and depths in the upper bypassed reach at 4 cfs are likely even greater (and hence equally or more suitable to target life stages) than determined using PHABSIM in the lower portion of the bypassed reach.

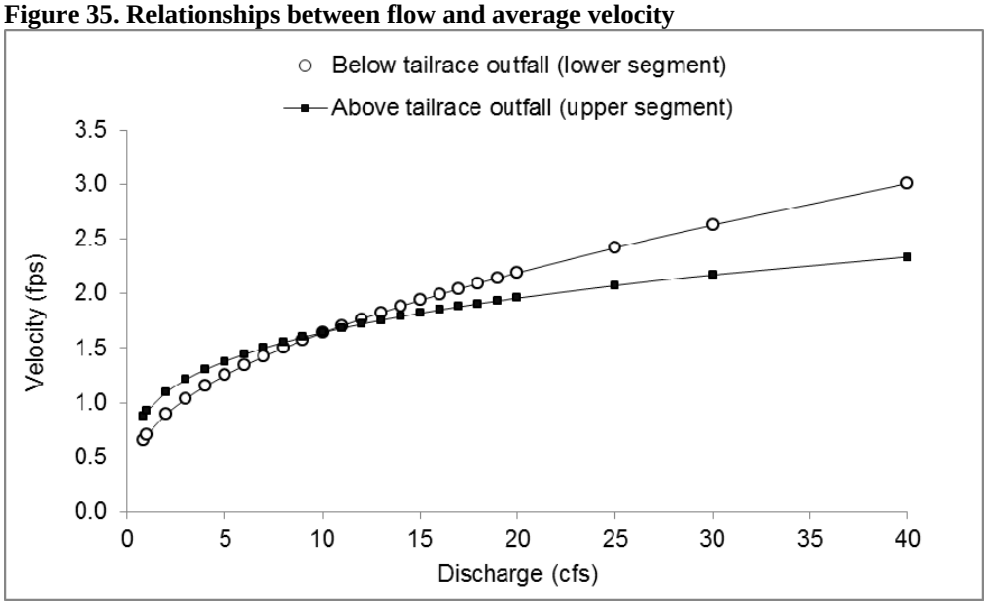
Therefore, PacifiCorp concludes that the PHABSIM study performed in the lower portion of the bypassed reach provides a representative (and perhaps even conservative) index of instream habitat-flow relations in the upper portion of the bypassed reach. This conclusion is supported with an additional separate analysis of comparative water velocities in the upper and lower portions of the bypassed reach. The PHABSIM study indicated that habitat changes in the East Fork Wallowa River are primarily velocity-driven. As such, the additional velocity analysis was considered a suitable method for verifying the assumption that hydraulic conditions (particularly velocities) in the upper portion of the bypassed reach are equivalent to or greater than in the lower portion of the bypassed reach. The additional velocity analysis used a Manning's Equation approach to estimate average velocities. Manning's equation requires specific knowledge of channel gradient, hydraulic radius, and flow resistance. The equation was solved with data collected during the habitat survey (gradient), the IFIM study (hydraulic radius), and a literature review (flow resistance). Appendix F provides a more complete description of methodology.

The velocity analysis indicated that average velocities in the upper and lower portions of the bypassed reach are similar up to flows of approximately 20 cfs. When flows are lower than 11 cfs, average velocities in the upper portion are slightly greater than in the lower portion by 0.03 to 0.22 feet per second (fps). At flows between 12 cfs and 20 cfs, the opposite occurs: average velocities in the upper portion are slightly less than in the lower portion by 0.02 to 0.19 fps.

As discharge increases above 20 cfs, the average velocities in the two stream portions continue to increase, but at relatively different rates. Velocities in the lower portion increase more rapidly, whereas velocities in the upper portion increase at a more moderate rate.

Average velocities in the lower portion are greater than in the upper portion by 0.30 fps (25 cfs) to 0.60 fps (40 cfs). The relationships between flow and average velocity are displayed in Figure 35.

Figure 35. Relationships between flow and average velocity



Based on these results, PacifiCorp concludes that the IFIM study performed in the lower portion represents conditions in the upper portion over the range of potential minimum flow releases considered by the study (0.8 cfs to 8 cfs, and unimpaired flows up to 16 cfs). The velocity analysis demonstrates that, when flows are less than 20 cfs, average velocities are similar between the two portions. At these relatively low flows, average velocity appears to be largely a function of bed roughness, or flow resistance. This observation is consistent with the findings of Wilcox (2005), whose research in high-gradient headwater streams in the Rocky Mountains indicated that bed roughness creates "very large flow resistance values at lower discharges." As further testament to the importance of bed roughness at low flows, we point to the n-values provided by Yochum and Bledsoe (2010): the two channel reaches that most nearly approximate the East Fork bypassed reach have identical n-values (i.e. bed roughness) of 0.20 at low flows[15]. Other variables, such as gradient or channel form, appear to be less important in explaining variation in average velocity at low flows.

As discharge increases above 20 cfs, average velocities in the two portions begin to diverge. Increased turbulence appears to be the driver behind the moderate velocity increases in the upper portion of the bypassed reach. The cascade channel form that characterizes the upper portion provides substantial spill resistance, defined as the flow resistance that occurs when rapidly flowing water impacts standing waters (Yochum, et al., 2012). Upon impact, energy

[15] The methods section in Appendix F explains how n-values diverge in the two reaches as flows increase, commensurate with the decreasing effect of channel roughness at higher flows.

dissipation occurs in the form of turbulent flows. Accordingly, as discharge increases above 20 cfs, the calculations indicate: (1) lower velocities in the high-gradient cascade portion where spill resistance is high; and (2) comparatively higher velocities in the lower gradient, plane bed portion, where channel form is conducive to laminar flow. These calculation results are supported by the findings of Comiti et al. (2007), which suggest that flow resistance increases with gradient. These findings help to explain the results of PacifiCorp's calculations of average water velocities in the East Fork bypassed reach. When flows exceed 20 cfs, differences in channel form, flow resistance, and velocity between the two portions of the bypassed reach prevent direct application of the habitat-flow relationships to the upper portion of the bypassed reach. However, there should be little need to estimate habitat conditions above 20 cfs because the range of minimum flow alternatives explored in the PHABSIM study only extends to 8 cfs.

The results of the above analysis support PacifiCorp's assumption that the PHABSIM results from the lower portion also serve as a representative index of instream habitat-flow relations in the upper portion, in particular for flows less than 20 cfs. However, as described previously, habitat suitability in the PHABSIM study reach is primarily velocity-driven. The above analysis indicates that PacifiCorp's recommended flow of 4 cfs would also provide suitable bull trout habitat in the upper portion of the bypassed reach, because water velocities in the more-turbulent upper portion at flows less than 20 cfs are similar, if not somewhat higher, than in the lower portion. Additionally, field observations in the upper habitat reach and professional judgment suggest the proposed 4 cfs minimum instream flow regime would provide a balanced flow that would be mutually beneficial to multiple life-stages of bull trout in this area.

About 50 percent of the 119 bull trout captured by PacifiCorp to date have occurred in the upper portion of the bypassed reach. Given the documented presence of large numbers of bull trout at roughly a tenth of proposed flows, the proposed increase to a year-round minimum flow of 4 cfs would be expected to fully support bull trout in the upper portion of the bypassed reach for two reasons. First, based on the capture of multiple life-stages of bull trout (fry, sub-adult, and adult), this population has been self-sustaining in this location at the present minimum flow release of 0.5 to 0.8 cfs for an unknown amount of time. Second, as stated above, an IFIM-based minimum instream flow recommendation of 4 cfs from the transect data collected in the lower portion of the bypassed reach is expected to maintain bull trout spawning habitat conditions in the upper portion of the bypassed reach with no deleterious effects.

Bull trout spawning habitat preferences are well documented in scientific literature. Numerous researchers have documented their propensity to spawn in shallow, low velocity stream margin areas (Fraley and Shepard 1989, McPhail and Baxter 1996). Given the known hydraulic habitat conditions and high gradient in the upper portion of the bypassed reach, along with the fact that IFIM modeling in this reach is not possible, care should be taken in the implementation of any proposed hydraulic change. PacifiCorp's concern is that

increasing minimum instream flows in this location beyond baseline could cause water velocity and depth to increase to a level not conducive to preferred bull trout spawning habitat characteristics, and thereby further degrade the relatively small amount of existing bull trout spawning habitat.

Evaluation of the Tailrace Reroute Option

As a second key element of the proposed modified instream flow releases in the East Fork bypassed reach, PacifiCorp proposes to reroute the powerhouse tailrace from its current point of discharge into the West Fork Wallowa River, to the East Fork lower bypassed reach. The proposed tailrace reroute would convey the full powerhouse discharge to the East Fork of the Wallowa River (up to 16 cfs). The tailrace reroute will provide two benefits to aquatic resources. First, it will eliminate the risk of stranding ESA-listed bull trout, kokanee, and other aquatic species in the existing tailrace when unit trips cause the headgate to close as described in Section 2.1.3. Second, the tailrace reroute would increase the amount of aquatic habitat available in the bypassed reach below the new discharge location on the East Fork Wallowa River. The tailrace reroute would affect approximately 2,600 feet (793 m) of accessible habitat from the point of entry to the mouth of the East Fork Wallowa River.

The degree to which a tailrace reroute would change total WUA over existing conditions for all lifestages is quantified in Table 23. The tailrace reroute scenario would augment flows in the East Fork bypassed reach throughout the year. The additional flows eliminate much of the velocity shelters during the spring runoff period, and as a result provides little to no habitat benefit during the spring runoff period. However, the reroute is predicted to provide increased habitat levels for every target lifestage relative to baseline conditions during August, September, and October. In the case of adult bull trout, total WUA is expected to at least quadruple during October. Even greater total WUA increases are predicted for spawning bull trout.

Table 23. Percent increase over baseline total WUA conditions for all lifestages provided by a tailrace reroute.

Month	Adult Bull Trout	Juvenile Bull Trout	Spawning Bull Trout	Spawning Kokanee
May	22%	-7%	--	--
June	-3%	-6%	--	--
July	6%	-7%	--	--
August	127%	11%	--	46%
September	267%	26%	285%	114%
October	365%	38%	520%	178%

As mentioned above in Section 2.2.1, PacifiCorp no longer proposes to retain the current tailrace channel, which discharges to the West Fork Wallowa River, for use as an emergency spillway. Instead, the intake structure will include an isolation gate at the pipeline entrance and a water level indicator connected to the existing forebay headgate control system. In the

event the pipe intake becomes clogged and or begins to flood, the level indicator would send an alarm signal to the headgate control closing it and stopping flow down the penstock. The main channel of the tailrace that currently cuts through Pacific Park Campground on the south side of the park road will be retained only to serve as a drainage feature in the campground and would not experience flows that would support fish. The braided tailrace side channels on the north side of the park road would be reclaimed and restored to match surrounding contours.

The tailrace reroute would further increase the amount of aquatic habitat available in the bypassed reach below the new discharge location by restoring the natural hydrology to the lower 2,600-foot (793 m) portion of the reach. The proposed tailrace reroute would convey the full powerhouse discharge to the East Fork of the Wallowa River (up to 16 cfs).

Although the main channel of the existing tailrace is currently used by bull trout, brook trout, rainbow trout, kokanee, mountain whitefish, and sculpin, the proposed tailrace reroute would result in the existing tailrace no longer being sufficiently watered to support fish. The tailrace reroute effectively removes all available fish habitat (985 feet (300 m) not including side channels) between the powerhouse and West Fork Wallowa River. Though the main tailrace channel is assumed to be cold water refugia for bull trout during the summer months, it presents the significant risk of fish stranding and subsequent desiccation due to unit trips that result in the penstock headgate closing. PacifiCorp believes the risk of stranding ESA listed bull trout outweighs the benefit of existing habitat conditions in the current tailrace.

Although fish use of the tailrace side-channels is certainly possible, it is likely not significant. To date, no fish have ever been captured or directly observed in the tailrace side-channels. Therefore, removal of these side channels is not expected to have a significant impact on aquatic habitat or species therein.

Though the current figure is unknown, based on historical data it is estimated that the proposed Project tailrace reroute could potentially divert, depending on time of year, up to 30-50 percent of the flow in the West Fork Wallowa River in the section from the present Project tailrace discharge and the confluence of the East Fork Wallowa River with the West Fork Wallowa River. Flows below this confluence point would be attenuated from the full flow discharging from the East Fork Wallowa River.

As part of assessing effects of the proposed tailrace reroute, kokanee spawner abundance was evaluated within the West Fork Wallowa River in September – November 2013. For comparison purposes, the West Fork Wallowa River was broken into three reaches: (1) Reach One consisted of the West Fork Wallowa River from Wallowa Lake upstream to the East Fork Wallowa/West Fork Wallowa River confluence; (2) Reach Two consisted of the East Fork Wallowa/West Fork Wallowa River confluence upstream to the Project tailrace discharge; and (3) Reach Three consisted of the West Fork Wallowa River from the Project tailrace discharge upstream to the anadromous/migratory fish barrier. Kokanee spawner

abundance estimates were independently assessed within each stream reach. The over-arching goal of the study was to assess kokanee spawner abundance and preferred spawning habitat within the West Fork Wallowa River.

Results of the kokanee spawner abundance evaluation revealed that during the 2013 kokanee spawn season 27,128 kokanee spawners ascended the West Fork Wallowa River. Of these, 86 percent were counted within Reach One, 10 percent within Reach Two, and 4 percent within Reach Three. During the course of the Study it was observed that Reach Two and Reach Three lacked preferred kokanee spawning habitat in terms of suitable sized gravel, water velocity, and off-channel habitat when compared to Reach One.

Based on 2013 kokanee spawner abundance and kokanee spawner use of available spawning habitat within the West Fork Wallowa River, Pacificorp believes potential deleterious effects to ESA-listed bull trout within the current Project Tailrace operation and configuration greatly out-weigh any loss of habitat to spawning kokanee within the West Fork Wallowa River due to the proposed Project tailrace reroute and subsequent diversion.

Additional detailed information on methods and results concerning the 2013 West Fork Wallowa River Kokanee Spawner Abundance Estimate are contained in the 2013 Aquatic Resources Updated Study Report (PacifiCorp 2013d) which was filed with FERC on January 3, 2014.

Effects of Proposed Project Flow Monitoring

In implementing the proposed modified instream flow releases in the East Fork bypassed reach, PacifiCorp would construct and operate a new and improved gage (flume) to monitor flows in the East Fork bypassed reach between the Project diversion dam and the new rerouted tailrace return location. Effects of the gage related to flow monitoring and compliance are discussed above in Section 3.3.2. Construction of the gage (flume) would cause temporary, localized disturbance of a small area of the stream channel at the gage site. The disturbance effects would be short-term and temporary in nature. In addition, the implementation of the proposed construction-related BMPs (as described in Section 2.2.3) would further minimize stream channel effects.

Effects of Proposed Sediment Management Program for Forebay Maintenance Flushing

As described in Section 2.2.2, it is necessary to flush accumulated native sediment from the Project forebay to prevent damage to the hydroelectric generating unit and continue operation of the Project. PacifiCorp proposes to cease the historic practice of flushing entrained native sediment from the forebay during the summer low-flow period in favor of flushing sediment from the forebay during peak spring runoff in the month of June. Annual forebay flushing would result in the removal of approximately 250 to 500 cubic yards of accumulated sediment from the forebay and the mobilization and transport of that sediment into the East

Fork bypassed reach.

The forebay flushing would likely impact downstream fish and their habitat, but the sediment management program would help to minimize such impacts to the extent practicable. The forebay flushing would be conducted concurrently with the snowmelt runoff and peak flows. As such, the increase in turbidity and fine sediments from forebay flushing would occur when turbidity and fine sediments are already naturally elevated. In addition, since the forebay flushing would be completed within 24 to 72 hours, the naturally-occurring seasonal turbidity and fine sediment runoff event would likely not be extended in duration.

Effects of the proposed forebay flushing program on sediment and substrate within the Project area are discussed in Section 3.3.1, Geology, Sediment and Substrate. Although, short-term localized effects to the existing baseline substrate conditions in the action area may occur as a result of forebay flushing, it is not expected to adversely affect substrate conditions in the Project area. The potential effects to fish of short-term elevated levels of total suspended solids and turbidity resulting from forebay flushing are discussed below.

Turbidity and fine suspended sediment effects on fish reported in the literature range from beneficial to detrimental (Newcombe and MacDonald 1991, Newcombe and Jensen 1996). For example, elevated turbidity and fine suspended sediment conditions have been reported to enhance cover conditions and reduce piscivorous fish/bird predation rates (Lloyd et al. 1987, Gregory and Levings 1998). On the other hand, elevated turbidity and fine suspended sediment conditions can cause physiological stress and reduce growth (Newcombe and Jensen 1996). Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore et al. 1980). Avoidance of turbid waters begins between about 25-70 NTU (Sigler et al. 1984, Lloyd 1987). Salmonids have been observed to move laterally (Servizi and Martens 1992), and downstream to avoid turbid plumes (McLeay et al. 1987). However, the presence of salmonids in the East Fork during the spring, when turbidity is naturally high, indicates these areas are not avoided altogether during high turbidity events.

Salmonids have evolved in river systems that periodically experience short-term (days to weeks) or seasonally-high elevated turbidity and fine sediment events (winter storms and floods) and are adapted to periodically high turbidity and fine sediment exposures. Adult and larger juvenile salmonids appear to be little affected by the 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).

As discussed above, PacifiCorp's Sediment Management Program will shift the timing of forebay flushing to June. This coincides with the onset of the annual high flow period, precedes the spawning period for bull trout and kokanee by three to four months, and is two

to three months after fry emergence for these two species. Rearing juvenile fish may be in the bypassed reach during this period; however, given that the average monthly stream flow in the bypassed reach during the month of June is 61 cubic feet per second (cfs) (PacifiCorp 2011) juvenile bull trout, brook trout and rainbows would be expected to be holding in the interstitial spaces between rocks or in pockets of lower velocity water along the river margins. Sediment flushed during these annual peak flows is expected to be quickly transported through the action area in the higher velocity water in the thalweg of the river. The month of June is a period of peak flows, naturally higher turbidity levels, and maximum annual sediment transport within the river. It is expected that flushing sediment from the Project forebay during this period will not significantly affect bull trout or other resident and rearing rainbow trout and brook trout individuals or juvenile rearing habitat within the Project area.

Given the timing of flushing during annual peak flows, the small volume of naturally-deposited sediment to be flushed, and the existing healthy and diverse macroinvertebrate community in the bypassed reach downstream of the natural fish barrier relative to other streams in the upper Wallowa River basin (PacifiCorp 2012 and PacifiCorp 2013d), annual forebay flushing is not expected to have an adverse effect on the aquatic macroinvertebrate community within the bypassed reach. It is expected that flushing sediment from the Project forebay during this period will not significantly affect bull trout or other resident and rearing rainbow trout and brook trout individuals or juvenile rearing habitat within the Project area.

As described in Section 2.2.3, PacifiCorp proposes to implement a Turbidity Monitoring Plan during forebay flushing. The Turbidity Monitoring Plan is discussed in Section 3.3.2, Water Resources. Implementation of the turbidity monitoring plan is not expected to have any effects on aquatic resources

Threatened and Endangered Aquatic Species

PacifiCorp, the Federal Energy Regulatory Commission (FERC), the USFWS, and relicensing parties have agreed to consult on one fish species per Scoping Document (SD) 1 (April 22, 2011), SD 2 (August 4, 2011) and changes in listing status since the Pre-Application Document was submitted. The federal Endangered Species Act (ESA) listing status (Threatened, Endangered or Candidate) and Critical Habitat designation for bull trout is discussed below.

Bull trout (*Salvelinus confluentus*) were first listed as threatened under the ESA on June 10, 1998 (63 FR 31647). This original listing included the Columbia River and Klamath River distinct population segments (DPSs). The USFWS later added the Jarbidge River, Coastal-Puget Sound, and St. Mary-Belly River DPSs to the listing. A final ruling was issued on November 1, 1999 that assigned threatened status to all populations of bull trout within the coterminous United States (64 FR 58910, 58933). The USFWS considers bull trout threatened because of habitat degradation and fragmentation, blockage of migratory

corridors, poor water quality, past fisheries management practices, and the introduction of non-native species (63 FR 31647).

Critical Habitat was originally designated for the Columbia River and Klamath River DPSs on October 6, 2004 (69 FR 59996). On January 13, 2010, the USFWS proposed to revise its designation of Critical Habitat for bull trout (75 FR 2270). In total, the USFWS proposed designating approximately 22,679 miles of streams and 533,426 acres (215,870 ha) of lakes and reservoirs in Idaho, Oregon, Washington, Montana and Nevada, and 985 miles of marine shoreline in Washington as Critical Habitat for bull trout. A final ruling on Critical Habitat for bull trout in the coterminous United States was designated on October 18, 2010, and included lower portions of the East Fork and West Fork Wallowa Rivers (75 FR 63898). As a result of the final Critical Habitat designation, bull trout populations were divided into six Recovery Units based on "assemblages of bull trout core areas (metapopulations, or interacting breeding populations) that retain genetic and ecological integrity and are significant to the distribution of bull trout throughout the conterminous United States" (75 FR 63898). The East Fork Wallowa River is located within the MC Recovery Unit.

Using the USFWS's *Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998), PacifiCorp developed a Biological Assessment (BA) of the effects of continued operation of the Wallowa Falls Hydroelectric Project on federally listed bull trout (*Salvalinus confluentus*) and associated critical habitat.

Affected Environment.

PacifiCorp's BA characterized baseline conditions throughout the Project area and Upper Wallowa River sub-basin (5th field Hydrologic Unit Code [HUC]). The Wallowa Falls Hydroelectric Project is located within the Upper Wallowa River 6th field HUC, which includes both the East and West Forks of the Wallowa River and drains approximately 18 percent of the 5th field Upper Wallowa River sub-basin. Major tributaries within this sub-basin include Bug Creek, BC Creek, Johnson Creek, Adam Creek, and Lake Creek (tributaries to the West Fork Wallowa River), and Royal Purple Creek, a tributary to the East Fork Wallowa River.

The Upper Wallowa River 6th field HUC drains an undeveloped part of the Wallowa Mountain range which includes a portion of the Eagle Cap Wilderness Area. The topography of the Project area is steep, and includes narrow mountain valleys below sharp mountain peaks. Valley floors and lower slopes are predominately forested, with upper slopes characterized by ridges, rock outcrops and talus slopes. Mixed montane forests in the area are dominated by conifers such as grand fir (*Abies grandis*), subalpine fir (*A. lasiocarpa*), western larch (*Larix occidentalis*), Engelmann spruce (*Picea englemannii*), lodgepole (*Pinus contorta*) and ponderosa (*P. ponderosa*) pines, and Douglas-fir (*Pseudotsuga menziesii*); deciduous trees include black cottonwood (*Populus balsamifera*) and quaking aspen (*P.*

tremuloides. Land use throughout the Project area is predominantly undeveloped forest lands, with a mix of residential development and small industry, mostly mining and livestock grazing. Wallowa Lake dam, located just south of Joseph, Oregon, prevents upstream and downstream fish passage above Wallowa Lake (PacifiCorp 2011a).

The Eagle Cap Wilderness is at a northern margin of a belt of metalliferous geologic deposits, with the principal metals being gold, copper, and silver, with minor lead deposits (Weis et al. 1976). There is a history of mining in the Eagle Cap Wilderness, although mining claims in the vicinity of the Project are not well documented. Copper, molybdenum, tungsten, gold, and silver are known to be in the quartz veins and tactite zones of the Wallowa batholith or along its margins (Weis et al. 1976).

Flow within the East Fork Wallowa River is primarily driven by seasonal snowmelt runoff. Peak runoff occurs generally from May through mid-July, and by late July, little snow is left in the Wallowa Mountains. Runoff typically recedes to low flows by August and September. Flows may increase in fall in response to autumn rains, but relatively low flows generally persist from late fall through winter due to freezing conditions associated with the Project area's high elevation and inter-mountain climate patterns, which result in little or no direct runoff during this time.

Environmental Effects.

PacifiCorp addressed potential direct effects of the proposed action on bull trout pathways and indicators, and effects on bull trout Critical Habitat primary constituent elements (PCEs). The USFWS *Checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators* (USFWS 1998a) was used for this analysis in conjunction with the assessment of baseline conditions. Direct effects were assessed on the following:

- Subpopulation characteristics
- Water quality
- Habitat access
- Habitat elements
- Channel condition and dynamics
- Flow/hydrology
- Watershed conditions
- Integration of species and habitat conditions.

Proposed PM&Es (increased instream flows, rerouting of the tailrace, and shifting the timing of sediment flushing) enhance habitat and reduce project impacts to bull trout. Continued operation of the project with proposed PM&Es therefore will maintain and likely restore (improve) the above bull trout pathways and indicators relative to current baseline conditions.

Continued operation of the Wallowa Falls Hydroelectric Project with associated PM&Es will improve habitat for listed bull trout in contrast to existing conditions. Increased instream flows, eliminated risk of stranding in the Project tailrace, and reduced impacts of forebay flushing are significant enhancements to bull trout and aquatic resources in project-affected reaches of the East Fork Wallowa River. However, tailrace reroute construction may result in localized, short-term adverse effects. In addition, given the extended duration of the proposed action (50-year license), incidental "take" of juvenile or adult bull trout, e.g., mortality resulting from fish surveys, cannot be ruled out.

Reroute of the Project tailrace will cause reductions in West Fork Wallowa River flows, increased temperatures (on average 0.2 ºC and up to 0.8 ºC), and loss of habitat that the tailrace itself provides. While the existing tailrace channel is assumed to provide cold water refugia for bull trout during the summer months, it presents the significant risk of fish stranding and subsequent desiccation due to unit trips that result in the penstock headgate closing. PacifiCorp believes the risk of stranding ESA-listed bull trout outweighs the benefit of existing habitat conditions in the current tailrace, and within the West Fork Wallowa River between the current tailrace and East Fork Wallowa confluence.

Recent surveys of bull trout in the watershed below the impassible waterfall on the East Fork Wallowa River have demonstrated that a migratory life history exists in these fish (PacifiCorp 2013d). This suggests that, in contrast to primarily resident fish, operation of the Project under a new license with proposed PM&Es will enhance a bull trout subpopulation with greater likelihood to promote recovery of the Mid-Columbia River population as a whole.

Evaluation of potential effects of continued operation of the Wallowa Falls Hydroelectric project on Mid-Columbia River bull trout concludes that the proposed action will result in more than negligible probability of "take" of juvenile and adult bull trout, and therefore a finding of **may affect, likely to adversely affect** for the species as defined in *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998).

As noted above, effects to bull trout Critical Habitat were assessed on nine PCEs. Short-term, localized increases in background turbidity and sedimentation resulting from proposed construction of the tailrace reroute, and from annual forebay flushing activities are anticipated under the proposed action. As described in PacifiCorp's BA, the proposed SMP will minimize these impacts. Other impacts to Critical Habitat will be net positive, e.g., increased minimum flows. In total, the proposed action **may affect, and is likely to adversely affect** designated Critical Habitat for bull trout. Determinations of effect to specific bull trout Critical Habitat PCEs resulting from the proposed action are summarized below (Table 3.3-1).

Table 3.3-1. Determination of effects to bull trout Critical Habitat PCEs.

PRIMARY CONSTITUENT ELEMENTS[1]	DETERMINATION OF EFFECT
1) Springs, seeps and groundwater sources	May affect, not likely to adversely affect
2) Migratory habitats	Likely to adversely affect
3) Abundant food base	Likely to adversely affect
4) Complex aquatic environments	May affect, not likely to adversely affect
5) Water temperature	May affect, not likely to adversely affect
6) Substrates	Likely to adversely affect
7) Natural hydrograph	May affect, not likely to adversely affect
8) Permanent water quality and quantity	Likely to adversely affect
9) Non-native predatory species presence	May affect, not likely to adversely affect

Magnuson Stevens Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1996 established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA Section 305(b)(2)). Adverse effect means any impact that reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH means those waters and substrate necessary for spawning, breeding, feeding, or growth to maturity (MSA Section 3). This definition of EFH "waters" includes aquatic areas and their associated physical, chemical, and biological properties and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).
Consultation under Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

1. Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

2. NMFS shall provide conservation recommendations for any federal or state activity that may adversely affect EFH;

3. Federal agencies shall, within 30 days after receiving conservation recommendations from NMFS and provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation

recommendations of NMFS, the federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within, and those outside of EFH, e.g., upstream of the impassable barrier approximately 1,372 meters downstream of the Wallowa Falls dam. Any reasonable attempt to encourage conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of their location.

Affected Environment. EFH for the Pacific Coast Salmon fishery means those waters and substrate necessary for salmon production and to support a long-term sustainable fishery and salmon contributions to a healthy ecosystem (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation). To achieve that level of production, EFH must include all streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers identified by the Pacific Fisheries Management Council (PFMC 1999). Chief Joseph Dam, Dworshak Dam, and the Hells Canyon Complex (Hells Canyon, Oxbow, and Brownlee Dams) are among the listed man-made barriers that represent the upstream extent of the Pacific Coast Salmon fishery EFH. Pacific Salmon EFH excludes areas upstream of longstanding naturally impassable barriers (*i.e*., natural waterfalls in existence for several hundred years). In the estuarine and marine areas, Pacific Salmon EFH extends from the near shore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (230.2 miles) offshore of Washington, Oregon, and California north of Point Conception (PFMC 1999).

Activities associated with the proposed action will occur adjacent to and below the OHWM of the East Fork Wallowa River. As such, the project has the potential to affect designated Pacific Coast Salmon EFH for Chinook and coho salmon within the West Fork and mainstem Wallowa Rivers and their tributaries (NOAA 2008). Although the waterways within the project action area have been designated as EFH under the MSA, Wallowa Lake and upstream tributaries (East and West Fork Wallow Rivers) do not currently support Chinook or coho salmon populations given the presence of Wallowa Lake Dam.

Environmental Effects. Using the USFWS's *Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998), PacifiCorp's BA for federally listed bull trout provides an analysis of effects of continued operation of the Wallowa Falls Hydroelectric Project on nine PCEs within the action area that are collectively used to assess impacts to designated critical habitat. This analysis concluded that the proposed action **may affect, and is likely to adversely affect** designated Critical Habitat for bull trout. The

analysis is not directly relevant to an assessment of potential effects on Pacific Salmon EFH in all cases. However, shifting of forebay flushing to the June high flow period and increased minimum flows in the bypassed reach will benefit Pacific Salmon EFH. Based on this analysis, and the PM&Es described in this license application, continued operation of the Wallowa Falls Hydroelectric Project will have **minimal adverse effect to EFH.**

Table 24. Determination of effects to bull trout Critical Habitat PCEs.

PRIMARY CONSTITUENT ELEMENTS[1]	DETERMINATION OF EFFECT
10) Springs, seeps and groundwater sources	No effect
11) Migratory habitats	No effect
12) Abundant food base	May affect, not likely to adversely modify
13) Complex aquatic environments	May affect, not likely to adversely modify
14) Water temperature	May affect, not likely to adversely modify
15) Substrates	May affect, not likely to adversely modify
16) Natural hydrograph	May affect, not likely to adversely modify
17) Permanent water quality and quantity	May affect, not likely to adversely modify
18) Non-native predatory species presence	May affect, not likely to adversely modify

Cumulative Effects

The Wallowa River and Wallowa Lake, with respect to industrial and residential development, has been in a relatively stable state for many years. Some new developments (primarily residential and resort-tourism based) have taken place in the recent past. There have also been several Project-related erosion events that have had short term effects on aquatic habitat within the geographic scope. No significant modifications to Project operations affecting environmental resources have occurred. The Project dam is located above numerous natural physical barriers to anadromous species, and therefore does not result in any reduction in aquatic resource connectivity.

The Project has little to no impact on water quality parameters, as they pertain to anadromous fish habitat in the Wallowa River downstream of the Wallowa Lake dam including temperature and dissolved oxygen. Short term turbidity and substrate effects associated with forebay sediment flushing have occurred in the past in the East Fork and are expected to continue. Studies performed as part of this relicensing support the conclusion that these effects are short term.

Modifications to the Project facilities or operations are being proposed to address these resource issues. Primarily, rerouting the tailrace water will restore the lower East Fork Wallowa to an historic flow regime which will provide for riverine habitat enhancement. It is anticipated that no significant, impacts to potential future anadromous fish populations will occur as a result of relicensing the Project.

The ongoing human activity in the area of geographic scope will undoubtedly have some cumulative impact on anadromous fish habitat and other aquatic resources. However, the

environmental measures proposed in Section 2.2.3 of this license application should result in a significant improvement overall in aquatic habitat conditions.

With potential fish passage at the Wallowa Lake Dam, there will likely be a focus on reintroduction of sockeye salmon. Unless measures are placed to prevent other species from entering the Project area, it is likely that Chinook salmon, and steelhead could also recruit to the Project tributaries. This will have negative impacts to the resident kokanee and bull trout in terms of competition for food and space as well as positive impacts such as an increased prey base for bull trout and an increase in plankton production for kokanee due to an influx of marine derived nutrients.

3.3.4 Terrestrial Resources

The Project is located in the Wallowa Mountains on the East Fork of the Wallowa River. This area is typical of mountain valleys in that it is constrained by steep topography with mountain peaks, a valley floor, and forested slopes with exposed ridges, rock outcrops, and talus. Streams and rivers are typically high gradient and constrained by steep valley walls.

To determine the impacts and develop baseline information for the Project, PacifiCorp identified 5 terrestrial resource studies: Special Status Plants, Noxious Weeds, Riparian and Wetland, Vegetation Cover Type, and Wildlife Species. Each of the terrestrial resource studies used the same Study Area which includes all lands owned by PacifiCorp or Wallowa Whitman National Forests (WWNF) and that are within 328 feet (100 meters) of a Project facility. The Terrestrial map in Appendix G shows the estimated 126.5 acre (51.2 ha) Study Area which includes the entire proposed Project boundary, as well as all Project facilities including the forebay, entire access road, and tailrace (PacifiCorp Energy 2011). The Project can potentially affect, either directly or indirectly, each of the terrestrial resource areas and some of the proposed Project actions may affect more than one terrestrial resource. Each terrestrial resource study is addressed independently to more accurately describe the baseline conditions and the impacts from a proposed action.

The tailrace reroute was proposed in the summer of 2013 and extends beyond the Study Area; therefore it was not included as part of these studies. However additional permits will be required prior for constructing the proposed tailrace that would require a wetland delineation and ordinary high water mark determination to be completed prior to ground disturbance. In addition a special status plant survey would be completed to ensure that no federally or state listed as threatened or endangered plants are within the proposed tailrace reroute Project area. Currently none of the 3 species (*Lomatioum greenmani*, *Mirabilis macfarlanei*, *Silene spadingii)* that are federally or state listed as threatened or endangered and may occur in the vicinity of the Project boundary have suitable habitat within the Study Area or in the proposed tailrace reroute area. If future special status plant surveys find any federally or state listed as endangered or threatened plants then PacifiCorp would obtain applicable permits required prior to conducting activities that may affect that species.

Special Status Plants

Special status plants for the purposes of this Project are defined as any plant species that is on one or more of the following lists:

- Regional Forester's Special Status Species Lists for Sensitive Non-Vascular and Vascular plants on the Wallowa-Whitman National Forest
- United States Fish and Wildlife Service (USFWS) status that is Federally Listed, , Proposed, Candidate, and Species of Concern (USFWS 2010)
- Oregon Department of Agriculture (ODA) Status that is Listed Endangered, Listed Threatened, Proposed Endangered, Proposed Threatened, Candidate
- Oregon Biodiversity Information Center (ORBIC) List 1 or 2
- Wallowa-Whitman National Forest Strategic Plant Species List

This information was compiled into a list of special status plants that included their potential to exist in the Study Area, their probability of occurrence, and targeted survey time compiled from existing data sources on special status plant occurrences within 2.0-miles (3.2 km) of the Project area. These data sources included PacifiCorp's 1993 Biological Evaluation (PacifiCorp 1993), a 2012 review of the ORBIC data base (ORBIC 2012), and consultation with the USFS, Wallowa Valley Ranger District Botanist (J. Hutsafa 2012, pers. comm.). A complete list of Special Status Plant Species is available in the Updated Study Report (PacifiCorp 2013e).

There are several records of special status plant species within the 2 miles (3.2 km) of the Project boundary. The ORBIC has 15 records of special status plant species within 2 miles (3.2 km) of the Project, which includes 3 USFWS Species of Concern and 1 ODA Threatened species (ORBIC 2012). ORBIC has 1 record of USFWS Species of Concern plant within the proposed Project boundary. It is nine stems of *Botrychium montanum* from a 1991 observation near the dam's forebay (ORBIC 2012). In 1993, PacifiCorp conducted a rare plant survey prior to conducting construction on the dam (PacifiCorp 1993). The survey identified 157 plant species including a population of *Botrychium* spp. This was located behind (to the east) and beside (to the south) of the storage shed near the forebay (PacifiCorp 1993). Seven individual plants were identified but were unable to be distinguished to species and no other rare plants were identified during the survey. The USFS provided GIS data received in an email from Mike Gerdis to Russ Howison (PacifiCorp) on August 2, 2010 that identified from an August 4, 1991 observation *Botrychium montanum* and *Botrychium minganense* (currently not a Special Status Plant Species) northeast of the laydown and storage area near the forebay.

As part of the relicensing studies, a special status plant survey was completed in the Study Area (Appendix G). This study included two field surveys during the 2012 growing season and each survey was conducted by qualified Bio-Resources, Inc. staff botanists using the currently accepted Intuitive-Controlled Methodology, as described in "Survey protocols for survey and manage strategy 2 vascular plants" (Whiteaker et al. 1998). Survey methods and processes were documented using methods described in the Documentation Section of Wallowa Falls Botanical Inventory Methodology (USFS 2011), and Threatened, Endangered, and Sensitive Plants Survey Field Guide (USFS 2005). During each survey all habitats types were visited and surveyed to the intensity level as warranted for probability. As described above several data sources identified *Botrychium* species within the Study Area, therefore all alluvial terraces along the streams and the forebay area were considered high probability habitat and were intensely surveyed to 100 percent cover to for *Botrychium* species that met Special Status Plant Species criteria (i.e., *Botrychium ascendens, B. crenulatum, B. hesperium, B.lunaria, B. montanum, B. paradoxum, B. pedunculosum)* (BioResources 2012).

No special status plant species, including the *Botrychium* spp. previously documented in Project boundary, were detected within the Study Area during either of the plant surveys. The survey result maps and forms are available in the Updated Study Report (PacifiCorp 2013e).

Noxious Weeds

The Wallowa Falls Hydroelectric Project is at the gateway to the Eagle Cap Wilderness Area; therefore undetected and untreated noxious weeds infestations may promote the spread of noxious weeds into the pristine habitats of the Eagle Cap Wilderness Area. Limited data exists for noxious weeds sites in and around the Project, but ODA's Weedmapper database identified Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), meadow hawkweed (*Hieracium caespitosum*), myrtle spurge (*Euphobia myrsinites*), spotted knapweed (*Centaurea maculosa*), and tansy ragwort (*Senecio jacobaea*) in the vicinity [(i.e., 2.0 miles (3.2 km)] of the Study Area (Oregon Department of Agriculture 2011). Personal communication between Mark Porter, Coordinator of the Wallowa County Cooperative Weed Management Area, and Kendrick Moholt of Bio-resources, Inc. on 16 May 2012, identified that meadow hawkweed sites were located in a small area northwest of the confluence of Royal Purple Creek and East Fork Wallowa River and two sites south and west of the Wallowa Falls Powerhouse, and spotted knapweed had been located near the main trailhead parking area at the main WWNF trailhead. These noxious weeds locations as well as noxious weeds infestations identified during the Noxious Weeds Study are shown on the map provided in Appendix H.

PacifiCorp conducted a noxious weeds study to identify and map noxious weed populations on the lands and aquatic areas within the Study Area. A noxious weed was defined as any weed listed on ODA's State Noxious Weed Lists, Wallowa County Noxious Weed List, and the Oregon Aquatic Noxious Weed List. This provided a baseline map of existing infestation from both known reports and new discoveries and to identify areas that have high, medium,

and low noxious weeds potential. This information will be used to determine noxious weed management effectiveness and to provide target areas for future monitoring and treatments. The following table shows the noxious weeds identified, their current ODA and Wallowa County designation, and abundance within the Study Area. No aquatic noxious weeds were observed in the Study Area. Appendix H provides a map of the noxious weeds locations and identifies the area of high, medium, and low weed potential in the Study Area. <table 24??>

Table 25. Noxious Weeds Identified within the Study Area during the 2012 Noxious Weed Survey

Common Name	Scientific Name	ODA Designation	Wallowa County Designation	Infestation Size
Meadow hawkweed	*Hieracium caespitosum*	A & Target	B & Target	45 plants within 100 ft^2
				20 plants within 9 ft^2
St. John's Wort	*Hypericum perforatum*	B	B	50 plants within 80 ft^2
Houndstoungue	*Cynoglossum officinale*	B	B	1 plant within 1ft^2
				40 plants within 100 ft^2
Spotted knapweed	*Centaurea stoebe*	B & Target	A & Target	2 plants within 8 ft^2
Common Burdock	*Arctium minus*		B	2 plants within ¼ mile.
Bull thistle	*Circium vulgare*	B		50 plants within 1.5 mile
Canada thistle	*Circium arvense*	B	B	1000 plants within 1.5 mile
Oxeye Daisy	*Chrysanthemum leucanthemum*		B	1000 plants within 1.5 mile

Riparian and Wetland

The Project area is comprised of a v-shaped valley defined by high elevation mountain ridges and steep slopes. The East Fork Wallowa River gradient in the Project boundary is fairly high and varies from 8 to 19%. The steep terrain makes topographical indicators for streams relatively apparent and wetlands are primarily limited to areas with flat terrain, such as the campground and near the forebay. A Riparian and Wetland Study was completed as part of the relicensing to verify and correct locations of known waterbodies and to identify additional wetlands, seeps and/or seasonal flowing streams within the Study Area (Appendix I).

The USFS uses a Riparian Habitat Conservation Area (RHCA) standard width buffers by category (Forest Service 1990, Forest Service-BLM 1995), because the Project boundary is on PacifiCorp and WWNF owned lands, these standard buffer widths were applied to all streams and wetlands throughout the Study Area. Table 26 provides the RHCA definitions, identifies which stream, river, and wetland it applies to, and distinguishes between the total acres (ha) for each RHCA category on WWNF lands compared to the standard wetland and riparian buffers on PacifiCorp owned lands within the Study Area. The map provided in Appendix I shows the location of each stream, river, and wetland in the Study Area, land

ownership with the appropriate RHCA buffer or standard buffer as it applies to PacifiCorp-owned lands.

Table 26. Riparian and Wetland Buffers within the Wallowa Falls Hydroelectric Project Study Area

Riparian Habitat Conservation Area Category (Applies to WWNF lands only)	Minimum Riparian Habitat Conservation Area Standard Widths	Waterbody	Total Area [acres (ha)] within the Study Area
Category 1 - Fish-bearing Stream	Stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet (91 m) slope distance, whichever is the greatest.	EF Wallowa River	52.32 (21.17)
Category 2 - Permanently-flowing non-fish bearing streams	Stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet (46 m) slope distance, whichever is the greatest.	Royal Purple Creek	8.80 (3.6)
Category 3 – Ponds, lakes, reservoirs, and wetland greater than 1.0 acre (0.4 ha)	Consists of the body of the water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonal saturated soil, or the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet (46 m) slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.	None	0.0 (0.0)
Category 4 - Seasonally-flowing or intermittent streams, wetlands less than 1.0 acre (0.4 ha), landslides and landslide-prone areas	Must include: a. the extent of landslides and landslide prone areas b. the intermittent stream channel and the area to the top of the inner gorge. c. the intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation. d. for watersheds identified as key or priority watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide prone area to a distance equal to the height of one-site potential tree, or 100 feet (30 m) slope distance, whichever is greatest. e. for watersheds not identified as key or priority watersheds, the area from the edges of the stream	Intermittent Streams	1.97 (0.79)
		Trail Wetland #1	0.71 (0.29)
		Trail Wetland #2	0.69 (0.28)
		Forebay Wetland	0.88 (0.36)
		Tailrace Wetland	0.48 (0.19)

	channel, wetland, landslide, or landslide prone area to a distance equal to the height of one-half site potential tree, or 50 feet (15 m) slope distance, whichever is greatest.	Campground Wetland	0.56 (0.27)

Table 26. Riparian and Wetland Buffers within the Wallowa Falls Hydroelectric Project Study Area (continued)

Riparian and Wetland buffers on PacifiCorp- owned lands	Standard Widths	Waterbody	Total Area [acres (ha)] within the Study Area
Category 1 - Fish-bearing Stream	A distance equal to the height of two site-potential trees or 300 feet (91m) slope distance, whichever is the greatest.	EF Wallowa River, WF Wallow River, and Tailrace	39.24 (15.88)
Category 2 - Permanently-flowing non-fish bearing streams	A distance equal to the height of one site-potential tree, or 150 feet (46 m) slope distance, whichever is the greatest.	None	0.0 (0.0)
Category 3 – Ponds, lakes, reservoirs, and wetland greater than 1.0 ac (0.4 ha)	A distance equal to the height of one site-potential tree, or 150 feet (46 m) slope distance from the edge, whichever is greatest.	None	0.0
Category 4 - Seasonally-flowing or intermittent streams, wetlands less than 1.0 acre (0.4 ha), landslides	A distance equal to the height of one-site potential tree, or 100 feet (15 m) slope distance, whichever is greatest.	Tailrace Wetland	0.48 (0.19)
		Campground Wetland	0.56 (0.27)
		Intermittent Streams	0.18 (0.07)

Vegetation Cover

A vegetation cover study was completed to assess the quality and quantity of vegetation communities within the Study Area (Appendix J) to identify habitats that may be essential to special status plants and wildlife. The entire Study Area was differentiated into discrete units based on distinct vegetation communities and obvious topographic breaks. These units were then field verified and assigned a Plant Association Group (PAG) from one of the following guides: Plant Associations of Wallowa-Snake Province (Johnson and Simon 1987), Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests (Crowe and Clausnitzer 1997), and Deep Canyon and Subalpine Riparian and Wetland Plant Associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests (Wells 2006).

The Grand fir (*Abies grandis*) series is the most common forest cover type comprising 60.87% of the Study Area. The Grand fir/Big Huckleberry (*Vaccinium membranaceum*) is the most dominant PAG followed by Grand fir/Twinflower (*Linnaea borealis*), and one stand of Grand fir/Queens cup (*Clintonia uniflora*) that was located in a shady mesic area. The Subalpine fir (*Abies lasiocarpa*)/Big Huckleberry comprise 14% of the total Study Area and primarily occur above 4,500 feet (1,372 m) in elevation. Other forest types include small isolated pockets of Ponderosa pine (*Pinus ponderosa*)/snowberry (*Symphoricarpos albus*) on a rocky ridge and black cottonwood (*Populus balsamifera* L. ssp. *trichocarpa*)/pacific willow (*Salix lucida*) along the West Fork Wallowa River. Combined these two PAGs are less than 2% of the total study area.

Vegetation cover types were created for areas within the Study Area that did not meet PAG descriptions. This included developed, wetland, rock outcrops, and talus slope areas. The developed areas were identified as Developed (DEV) and include Project facilities and roads. Talus slopes were divided into 3 categories talus (TALU) for areas that were bare rock with less than 25% vegetation cover, talus-shrub (TALU-SHRU) are talus slopes with mixed shrub cover that is ≥ 25 percent of the vegetation cover, and talus slopes that had quacking aspen tree (*Populus tremuloides*) that is ≥ 25 percent the vegetation cover as Talus/Aspen (TALU-POTR). The rock outcrops with barren rock cliffs or sparse vegetation were denoted as rock outcrop (RO). The wetlands did not meet any of the PAG descriptions, so the USFWS Classification of Wetland and Deepwater Habitats of the United States system was used (Cowardin et al. 1979).

Table 27 shows each PAG, total acres (ha), and percent of total area in the Study Area. The map provided in Appendix J shows the distribution and size of vegetation cover type for the entire Study Area, as well as proximity to Project facilities and other sensitive habitats, such as rivers and wetlands.

Table 27. Plant Association Group Types and Acres within the Study Area.

PAG Name	PAG Code	Acres (ha) within the Study Area	Total Percent of the Study Area
Black	POTR2/SALA2	1.35 (0.55)	1.07
Developed	DEV	1.58 (0.64)	1.25
Grand Fir/ Queen's Cup	ABGR/CLUN	1.75 (0.71)	1.38
Grand Fir/Twinflower	ABGR/LIBO2	15.24 (6.17)	12.05
Grand Fir/Big	ABGR/VAME	59.73 (24.18)	47.22
Palustrine Emergent	PEM	0.11 (0.04)	0.09
Palustrine Scrub Shrub	PSS	0.34 (0.14)	0.27
Palustrine	PUB	0.28 (0.11)	0.22
Ponderosa Pine/Common	PIPO/SYAL	1.03 (0.42)	0.81
Rock Outcrop	RO	1.55 (0.63)	1.23
Subalpine Fir/Big	ABLA2/VAME	18.24 (7.38)	14.42
Talus	TALU	9.78 (3.96)	7.73
Talus/Aspen	TALU/POTR	7.74 (3.13)	6.12
Talus/Shrubland	TALU/SHRU	7.78 (3.15)	6.15
	Total	**126.50 (51.2)**	

Wildlife

Limited data is available on wildlife use within the Study Area. The ORBIC database documented a 1984 record for the Wallowa rosy-finch (*Leucosticte tephrocotis wallowa*) and bald eagle (*Haliaeetus leucocephalus*) nests and roosts between 0.5 and 2 miles (0.8 and 3.2 km) from of the Project boundary (ORBIC 2010). Additional comments from the WWNF stated that bald eagle use is high near the Project's campground and this is a known bald eagle foraging area when kokanee (*Oncorhynchus nerka*) are spawning (USFS 2011).

As part of relicensing, a Wildlife Study was completed to collect baseline information on the occurrence, distribution, and relative abundance of wildlife species within the Study Area

(Appendix G). The study documented all wildlife detections with special emphasis on species identified on one or more of the following lists:

- USFWS status that is Listed Endangered, Listed Threatened, Proposed Endangered, Proposed Threatened, Candidate, Species of Concern, and Partial Status
- Oregon Department of Fish and Wildlife (ODFW) List of Threatened, Endangered and Sensitive Species
- ORBIC List 1 or 2
- Regional Forester's Special Status Species Lists for Sensitive Vertebrates and Federally Threatened, Endangered, and Proposed Management Indicator Species for the Wallowa Whitman National Forest

Field surveys were conducted in both the spring and summer of 2012 and documented all wildlife species or sign detected. Table 28 documents the species that were detected within the Study Area.

Table 28. Species Detected within the Study Area

Common Name	Species Name	Status[1]	Abundance
American dipper	*Cinclus mexicanus*	None	Common
American robin	*Turdis migratorius*	None	Common
Beaver	*Castor Canadensis*	None	Uncommon
Black bear	*Ursus americanus*	None	Uncommon
Black-headed grosbeak	*Pheucticus melanocephalius*	None	Uncommon
Dark-eyed Junco	*Junco hyemalis*	None	Common
Golden-crowned kinglet	*Regulus satrapa*	None	Common
Mac Gillivary's warbler	*Oporornis philadephia*	None	Common
Mountain chickadee	*Poecile gambeli*	None	Common
Mule deer	*Odocoileus hemionus heminous*	None	Common
Northern flicker	*Colaptes aurauys*	None	Common
Norway rat	*Rattus norvegicus*	None	Uncommon

Table 28: Species Detected within the Study Area (continued)

Common Name	Species Name	Status[1]	Abundance
Olive-sided flycatcher	*Contopus cooperi*	Federal Status - SOC State Status –SV ORBIC List - 4	Common
Pika	*Ochotona princeps*	None	Uncommon
Pileated woodpecker	*Dryocopus pileatus*	Federal Status- none State –SV WWNF – Management Indicator Species	Uncommon
Pine siskin	*Carduelis pinus*	None	Uncommon
Red-breasted nuthatch	*Sitta canadensis*	None	Uncommon
Red squirrel	*Tamiasciurus hudonicus*	None	Common
Rocky Mountain tailed frog	*Ascaphus montanus*	Federal Status –SOC State Status – SV ORBIC List – 2	Uncommon
Rubber boa	*Charina bottae*	None	Uncommon
Ruby-crowned kinglet	*Regulus calendula*	None	Uncommon
Snowshoe hare	*Lepus americanus*	None	Uncommon
Swainson's thrush	*Catharus ustulatus*	None	Common
Townsend's warbler	*Dendroica tonewnsendi*	None	Common
Western tanager	*Piranga ludoviciana*	None	Common
Western terrestrial garter snake	*Thamnophis elegans*	None	Uncommon
Western wood peewee	*Contopus sordidulus*	None	Common
White-crown sparrow	*Zonotrichia leucophrys*	None	Common
Winter wren	*Troglodytes troglodytes*	None	Common
Yellow-rumped warbler	*Dendroica coronata*	None	Common

[1]Status codes: Federal SOC= species of concern State SV= sensitive-vulnerable, ORBIC 2=threatened with extirpation from the state of Oregon, and ORBIC 4= contains taxa which are of conservation concern but are not currently threatened or endangered (ORBIC 2010a).

In addition to general wildlife observations, streams and rivers within the Study Area were surveyed for amphibians. Two Rocky Mountain tailed frogs were detected; both were located in the East Fork Wallowa River reach directly upstream of the forebay. The detection included one juvenile and one adult frog within proximity of each other. A 2013 fish study located a Rocky Mountain tailed frog and a rubber boa in the lower bypassed reach of the East Fork Wallowa River. Since the tailrace channels and entire bypass channel provides suitable habitat for all life stages of tailed frogs it is assumed that tailed frogs may be found in all streams and rivers within the Study Area.

3.3.4.1 Environmental Effects

Special Status Plants

Project operations with potential to affect vegetation are expected to be similar to current operations, which include road maintenance, erosion control, forebay flushing, and

vegetation management. No additional Special Status Plant Species were detected within the Study Area and operations would occur in areas that have been regularly disturbed, such as the forebay, access road, penstock, or campground, therefore it is unlikely that future operations would adversely affect Special Status Plants. The previous documented locations of the USFWS Species of Concern, *Botrychium montanum,* were not relocated. However this species is difficult to detect due to their minute size, a life cycle that occurs mostly below ground with short periods of emergence, and extended periods of dormancy, so it is possible this plant still exists at these locations. (Ahlenslager and Potash 2007). PacifiCorp will continue Special Status Plant Species surveys near the forebay for 5 consecutive years to determine whether or not this species population still exist (Potash 1998). Until the surveys are completed, Botrychium habitat in this area will avoided for any ground disturbing activities and/or herbicide applications to avoid impacting undetected plants. If additional surveys relocate this population of *Botrychium montanum* or other Special Status Plant Species within the Project boundary then best management practices would be developed to protect the species.

If Project operations require ground disturbance or vegetation removal in areas that are outside of the Study Area (Appendix J) or in areas that are not routinely disturbed then a special status plant survey would be conducted prior to conducting the activity. The proposed tailrace reroute to the East Fork Wallowa River will require ground disturbance in areas that extend beyond the Study Area. A Special Status Plant Survey will be conducted within the proposed tailrace Project's footprint prior to construction. If a special status plant species is located then all necessary federal and/or state permits will be obtained prior to construction. These surveys would follow the same methods as described in Revised Study Plan with an updated list of special status plants (PacifiCorp 2011c).

Noxious Weeds

Overall the noxious weeds infestation sites are relatively small and can be easily controlled. The target weeds in the Study Area include meadow hawkweed and spotted knapweed. These were located in 7 locations with less than 50 plants and are a priority species to control. The remaining noxious weeds sites are Class B and are small populations, except for Oxeye daisy, Canada thistle, and bull thistle, which have infestations that are between 50 to 1,000 plants that are ubiquitous in the Study Area. All noxious weeds sites were located along the maintenance road, trail, and campground areas, which are areas of high and medium noxious weeds potential as identified in the map on Appendix H. Currently PacifiCorp has no noxious weed monitoring or management plan for the Wallowa Falls Hydroelectric Project. Therefore as part of the relicensing efforts PacifiCorp has developed a weed management plan to control and prevent infestations on all WWNF and PacifiCorp owned lands within the Project boundary. This plan is provided in Appendix K and provides strategy for monitoring, best management practices to reduced noxious weeds infestations, and recommended control methods.

There are no known aquatic invasive animals within the Project boundary. Routine Project operation requires relatively little in-water work, so the risk from introduction of aquatic invasive from Project operations is low. Regardless to minimize risk of aquatic invasive species introductions, PacifiCorp personnel and our designated contractors comply with Oregon State Aquatic Invasive Species Prevention Program (ODFW 2014).

Wetland/Riparian

The Project operations with potential to affect wetland/riparian habitats, either by vegetation removal or ground disturbance, are expected to be similar to current operations which include road maintenance, erosion control, forebay flushing, and hazard tree management. Although these activities occur in riparian and wetland areas, they typically occur in the same location (e.g. dam, access road, forebay). Therefore no new disturbance to riparian and wetland habitats are expected as part of routine operations.

The proposed tailrace reroute to the East Fork Wallowa River will affect wetlands. The tailrace is the primary hydrological source for both the Tailrace and Campground Wetlands (Appendix I). These wetlands are artifacts of the Project and are relatively small [0.03 and 0.05 acres (0.12 and 0.02 ha)]. Once the reroute is complete, it expected these wetlands will completely dry up and eventually become upland habitat. The additional flow to the East Fork Wallowa River is not expected the significantly modify the channel or increase the ordinary high water mark, therefore changes to the riparian habitats along the East Fork Wallowa River are expected to be negligible.

The tailrace reroute extends beyond the Wetland and Riparian Study Area, so it is possible the proposed project may affect wetlands that are outside of the Study Area. Prior to construction a wetland and ordinary high water mark delineation will be completed to determine all wetlands and water course boundaries within the proposed tailrace footprint. Based on these finding, any necessary federal, state, and local permits will be obtained prior to construction. Any mitigation required to offset wetland and riparian impacts will be determined at the time of permitting. Also, any additional proposed management activities that require ground disturbance and will occur within an riparian or wetland area, a wetland delineation or ordinary high water mark determination should be conducted to identify the exact boundary.

Vegetation Cover

The future Project operations are expected to be similar to current operations, which include road maintenance, erosion control, forebay flushing, and are unlikely to affect vegetation to the extent that it would change the vegetation cover type. However, hazard tree management, if extensive and limited to a small area, could potentially affect a vegetation cover type. Current operations for hazard tree management include only a few trees per location and routinely occur near the hydroelectric facilities (i.e., penstock, dam, and

powerhouse) and the recreational areas (campgrounds, parking area). PacifiCorp has developed a hazard tree management plan (Appendix L) to provide routine inspection and identification of hazard trees and best management practices for control.

Wildlife

The future Project operations are expected to be similar to current operations, which include road maintenance, erosion control, forebay flushing, and hazard tree management for recreation and hydroelectric facilities. Most of these operations occur in the previously disturbed areas and will not adversely affect wildlife species. Two operations that may affect wildlife include hazard tree management and forebay flushing. Hazard tree management effects to wildlife are minimized by following the best management practices in the Vegetation Management Plan (Appendix L). To comply with the Migratory Bird Treaty Act, tree removal will be restricted to August 1 through February 28 to avoid impacting nesting birds.

The annual forebay flushing may affect Rocky Mountain tailed frogs. These frogs are highly aquatic spending most of their lives in the streams, venturing onto upland habitats only after they are fully metamorphosed and outside of the breeding season (Olson 2011). To minimize the effects to frogs, the forebay flushing is proposed to occur in early June to coincide with the onset of the annual high flow period. Flushing during the high flow period will facilitate discharging sediments into the fast moving thalweg of the river discouraging sediment deposition in the margins of the stream channel. In addition the impacts of elevated turbidity on frogs will be minimized by restricting the flushing to a short duration (24-72 hours annually) and the seasonal timing of flushing. June avoids the primary oviposit period for frogs, which occurs in the spring to early summer after the high flows abate (Olson 2011).

The proposed tailrace reroute should have no impact on wildlife species. It will be completed in area that is Grand fir/big huckleberry Plant Association Group (PAG) and is adjacent to an area of high recreational use (i.e., the trailhead parking, Oregon State Parks warehouse, campground). Any tree removal required by the Project will occur outside of the migratory bird nesting season (March 1 to July 31) to avoid impacts to nesting birds.

The USFS has identified Management Indicator Species (MIS) as indicators for suitability of a habitat type and changes in their population may indicate effects of management or other species that share similar habitat requirements. The MIS identified as having potential to occur in the Project boundary include: Rocky Mountain elk, pileated woodpecker, rainbow trout (see Section 3.3.3.1), northern three-toed woodpecker, American marten, and primary cavity excavators.

Rocky Mountain elk (*Cervus elaphus*) is an Oregon game species that is typically found in forested and mountainous habitats. Elk require a mosaic of habitat types; that is early seral habitat for foraging and later seral habitat for cover. Elk use lower elevation open areas with

abundant forage habitat in the winter and then will move to the higher elevation forested habitat in the summer months. Overall elk use in the Project boundary and vicinity are low. Project operations will not result in major modifications to forested habitat and increase in human disturbance to habitats. The proposed tailrace reroute is located in area with relatively high human disturbance from the adjacent road, Oregon State Parks maintenance building, and recreation. Areas that will have ground disturbance would be planted with locally adapted native species and would improve overall foraging habitat for big game. Debris piles from vegetation clearing will be reduced to the extent possible to avoid impeding big game passage.

Pileated woodpecker (*Dryocopus pileatus*) is an ODFW Sensitive Vulnerable species. This species is an indicator of large diameter snags and down logs in older forest habitats. This species was observed in the Study area and the Project boundary provides suitable habitat with mature forest habitats and several large diameter snags. The Project will require the removal of hazard trees to Project facility and maintain public safety. This is not likely to result in the removal of significant number of trees on WWNF lands, with the exception of catastrophic events (e.g. severe weather, forest disease or fire). To minimize effects to pileated woodpeckers tree removal will be scheduled, when feasible, outside of the active nesting periods for most birds (March 1 to July 30), and trees that are removed on WWNF lands would left on site to provide large down wood

Northern three-toed woodpecker (*Picoides tridactylus*) is an ODFW Sensitive Vulnerable species. This species is an indicator of dead/down tree habitat in mature and old growth stands. This woodpecker inhabits lodgepole pine (*Pinus contorta*) stands and may be found in mixed conifer stands with lodgepole pine as a component (Marshall et al. 2003). Bark beetles appear to be essential forage for three-toed woodpeckers; therefore they prefer stands with disease or fire (Marshall et al. 2003). They nest fairly low in and often in smaller diameter trees than preferred by most cavity nesting birds (Marshall et al. 2003). Lodgepole pine is not a dominant species in the Study area but does exist throughout the mixed conifer stands in the Project boundary. The Project will require the removal of hazard trees to Project facility and maintain public safety. Although this may require the removal of preferred tree of their habitat, this is not likely to result in the removal of significant number of trees. To minimize effects to three-toed woodpeckers tree removal will be scheduled outside of the active nesting periods (March 1 to July 30) and trees on WWNF lands that need to be removed would be left on site to provide large down wood.

Pacific marten (*Martes caurina*) formally known as American marten is an ODFW Sensitive Vulnerable species. This species is an indicator for mature and old growth stands at high elevation. They are found in a variety of forest habitat types if adequate food and cover is available (Verts and Carraway 1998). Preferred habitat is late-successional conifer mesic stands with complex structure near the ground (Stone 2010). Although there are no known records of martens in the Study Area, there is suitable marten habitat within the Project

boundary. The Project's tree removal is not expected to be to the extent that would significantly change forested habitat; therefore the Project would have no effect martens.

Primary Cavity Excavators are a class of species that rely on decadent trees, snags and down logs as their habitat. Because each species requirement differs, it is hard to quantify the number and size of snags and down wood that is required to provide suitable habitat. Throughout the Project boundary there are snags and down wood that varies in size, species, and decay class. The Project may require tree removal, including snags or decadent trees, to reduce hazards to the facilities or public safety. Although these provide primary cavity excavators habitat, the tree removal is not expected to be significant and effects will be minimized by scheduling tree removal outside of the active nesting periods (March 1 to July 30) and trees removed on WWNF lands would be left on site to provide large down wood.

The only transmission line associated with this project is a 20-foot-long (7 m), 7.2-kilovolt (kVa) transmission line that connects the Powerhouse to Wallowa Falls substation. The powerhouse, transmission line, and substation are enclosed in a fenced area that is void of vegetation. According to PacifiCorp's Bird Mortality Tracking System (BMTS) there are no records of avian fatalities, bird nest, or other wildlife use in the facility. The line was constructed before the Avian Power Line Interaction Committee (APLIC) standards were developed, but currently the transmission line and substation have presented no risk or adverse effects to birds or other wildlife. If a bird mortality or nest was observed in the substation it would be recorded in PacifiCorp's BMTS and the appropriate corrective measures would be implemented.

Project operations and the proposed tailrace reroute are not expected to adversely affect bald eagles because the Project boundary is greater than 0.5 mi (0.8 km) from any known bald eagle roost or nest. The bald eagles have been known to forage on kokanee in the West Fork Wallowa River near the campground during the kokanee spawning season (September to November). Project operations and the proposed tailrace reroute will redirect diverted flows back to the East Fork Wallowa River, this not expected to have a significant effect on foraging bald eagles because the majority of kokanee spawning is below the confluence of the West Fork and East Fork Wallowa Rivers. Project operation occurs away from the West Fork Wallowa River, so disturbance from Project operations is unlikely. The Project's campground is adjacent to the bald eagle foraging habitat, but recreational use is minimized at the time of peak bald eagle use. In addition, because the campground has been in operation for many years, it is likely that bald eagles have adapted to presence of human activity at this location. PacifiCorp will implement a Vegetation Management Plan (Appendix L) that may require removing a hazard tree along the shoreline of West Fork Wallowa River. This would only be conducted if the trees are imminent threat to public safety or operations.

3.3.5 Threatened and Endangered Species

PacifiCorp, FERC, the USFWS, and relicensing parties have agreed to consult on three plant

species, three wildlife species, and one fish species per Scoping Document (SD) 1 (April 22, 2011), SD 2 (August 4, 2011) and changes in listing status since the Pre-Application Document was submitted. The federal Endangered Species Act (ESA) listing status (Threatened, Endangered or Candidate) for each species is shown below. Potential effects of proposed Project facilities, operation and environmental measures to terrestrial plant, wildlife and fish species are discussed in the following Sections 3.3.5.1 Affected Environment and Section 3.3.5.2 Environmental Effects. Table 29 is a summary of the species status and determination of effects.

Table 29. Federal Endangered Species Act Listing Status and Determination

Common Name	Species name	Status	Species	Critical Habitat
MacFarlane' four o' clock	*Mibabilis macfarlanei*	Threatened	No effect	Not designated
Spalding's catchfly	*Siline spaldingii*	Threatened	No effect	Not designated
Whitebark pine	*Pinus albicaulis*	Candidate	No effect	Not designated
North America wolverine	*Gulo gulo luscus*	Proposed Threatened	No effect	Not designated
Canada lynx	*Lynx Canadensis*	Threatened	No effect	No effect
Gray wolf	*Canis lupis*	Recovered	No effect	Not designated
Bull trout	*Salvenius confluentus*	Threatened	May affect, likely to adversely affect	May affect, and is likely to adversely affect

PacifiCorp has prepared a Biological Assessment (BA) to address the effects of the proposed Project facilities, operation and environmental measures on bull trout and their designated Critical Habitat and Essential Fish Habitat as designated under the Magnuson-Stevens Fishery Conservation and Management Act of 1996. The BA will be filed under separate cover.

3.3.5.1 Affected Environment

The following is a discussion on each listed species current status, critical habitat, and summary of life history.

MacFarlane's four o'clock *(Mirabilis macfarlanei)* - MacFarlane's four o'clock is federally listed as threatened. It inhabits gently sloped to very steep southwest to west aspect rock slides and canyon walls with sandy to gravelly soil underlain by talus in the Snake and Imnaha River Canyons (Oregon Flora Project 2006, Natureserve 2013). Associated plants

include bluebunch wheatgrass *(Agropyron spicatum)*, cheatgrass *(Bromus tectorum)*, sand dropseed *(Sporobolus cryptandrus)*, and scorpion weed *(Phacelia heterophylla)*. This species has been able to persist in areas historically grazed by livestock since the 1870's, and presently in poor ecological condition (NatureServe 2013). No critical habitat has been designated for species (USFWS 2014a). The major threats to this species remaining populations are herbicides, trampling, grazing, fire, landslides, and flooding (USFWS 1985).

Spalding's catchfly *(Silene spaldingii)* - Spalding's catchfly o'clock is federally listed as threatened and occurs primarily within open grasslands (Palouse Prairies), with a minor shrub component and occasionally with scattered conifers (ponderosa pine *[Pinus ponderosa]*). It is found most commonly in the Idaho fescue *(Festuca idahoensis)*/snowberry *(Symphocarpus* sp.*)* association at elevations of 1,900 - 3,050 feet (579 – 929.6 m). Populations have been found on all aspects, although there seems to be a preference for north face slopes (WNHP 1997). Soils are almost always productive, deep loess (NatureServe 2013). No critical habitat has been designated for species (USFWS 2014b). Threats to Spalding's catchfly include invasive plant species, isolated populations, fire regime changes, land conversion, grazing, trampling, herbicide, and off road vehicle use (USFWS 2007).

Whitebark pine *(Pinus albicaulis)* - Whitebark pine is federally designated as a Candidate for Endangered Species Protection (July 19, 2011, 76 FR 42633). Whitebark pine has large, wingless, nutrient-rich seeds that remain in the indehiscent cone after maturity. It is not adapted for wind dissemination and is almost entirely dependent on Clark's nutcracker *(Nucifraga columbiana)* for successful dispersal and reproduction. This species occupies montane forests on thin, rocky, cold soils at or near timberline [4,000-12,000 feet (1219 - 3657 m)]. In moist mountain ranges, whitebark pine is most abundant on warm, dry exposures; but in semiarid ranges, it becomes prevalent on cool exposures and moist sites (NatureServe 2013). Isolated stands of whitebark pine are known to be present in the Wallowa Mountains (July 19, 2011, 76 FR 42633) and suitable habitat for the species may be present in the Project vicinity. The whitebark pine listing status change to Candidate species following the submittal of the Pre-Application Document, therefore it was not identified as a Special Status Plant or as threatened and endangered species and was not a target botanical species during field studies (BioResources 2012). Major threats to whitebark pine include habitat loss, white pine blister rust, mountain pine beetle, fire, and climate change (USFWS 2011). No critical habitat has been designated for species (USFWS 2014c).

North American wolverine (*Gulo gulo luscus*) is a federally listed as proposed threatened. Their habitat consists entirely of alpine, arctic, and sub-arctic regions (USFWS 2013a). Reliable snow cover into the spring (April 15 to May 14) is key to their habitat selection (USFWS 2013b). Females depend upon deep snow to create dens for pregnancy and weaning periods (USFWS 2013a). North American wolverine habitat areas are typically isolated and often surrounded by areas of unsuitable habitat (USFWS 2013b). North American wolverines are primarily nocturnal, but are active during the day as well (NatureServe 2013). No critical habitat has been designated for this species (USFWS 2014d). Primary threat to wolverines is

habitat and range loss due to climate change; other less threats include trapping, development, and disturbance (UFSWS 2014d).

Canada lynx (*Lynx canadensis*) is a federally threatened species that dens in forests with large woody debris, such as downed logs and windfalls, to provide denning sites with security and thermal cover for kittens. Forests older than 200 years with lodgepole pine, spruce (*Picea* sp.), and subalpine fir have been used for denning in Washington. Den sites must provide for minimal disturbance by humans and proximity to foraging habitat (early successional forests), with denning stands at least 2.5 ac (1.0 ha) in size. Intermediate age forests allow for lynx access between den sites and foraging areas, movement within home ranges, and random foraging opportunities (PacifiCorp 2013e). Critical habitat has been designated for this species, but there is no critical habitat in Oregon (USFWS 2014e).

Gray wolves *(Canis lupus*) The Fish and Wildlife Service removed the Northern Rocky Mountain Gray Wolf Distinct Population Segment, which includes the eastern third of Oregon, from the Endangered Species List in May 2011 due to recovery (ODFW 2013) and there is no critical habitat for gray wolves in Oregon (USFWS 2014f). Gray wolves are habitat generalists that establish territories anywhere there is a sufficient food source (PacifiCorp 2013e). Wolf packs typically hunt within specific territories. Territories as large as 50 square miles (130 km^2) are not uncommon and can extend up to 1,000 square miles (2590 km^2) in periods of prey scarcity (USFWS 2006). Members of the Imnaha wolf pack are the closest known wolf pack to the Project boundary and have been documented in Wallowa County since 2008. At the end of 2012 it included eight members (ODFW 2013).

3.3.5.2 Environmental Effects

The following section provides a summary of the effects of the Project's ongoing effects and proposed environmental measures may affect each listed species and critical habitat.

MacFarlane's four o'clock *(Mirabilis macfarlanei)* – There are no records of this species with the Project boundary. The Special Status Plant Species Surveys did not detect any of the plants and did not locate any suitable habitat for this species within the Study Area (BioResources 2012). As a result this Project would have no effect on this species. No critical habitat has been designated for this species; therefore the Project would have no effect on critical habitat.

Spalding's catchfly *(Silene spaldingii)* - There are no records of this species with the Project boundary. The Special Status Plant Species Surveys did not detect any of the plants and did not locate any suitable habitat for this species within the Study Area (BioResources 2012). As a result this Project would have no effect on this species. No critical habitat has been designated for this species; therefore the Project would have no effect on critical habitat.

Whitebark pine *(Pinus albicaulis)* - The Project boundary is at 5,800 feet (1,768 m) in elevation and is within the range of whitebark pine, but because the Project boundary is below timberline for the Wallowa Mountains it is unlikely to support this species. Neither the 1993 rare plant survey nor the 2012 special status plant survey identified whitebark pine in the comprehensive plant species list (BioResources 2012, PacifiCorp 1993). As a result this Project would have no effect on this species. No critical habitat has been designated for this species; therefore the Project would have no effect on critical habitat.

North American wolverine (*Gulo gulo luscus*) is a federally listed as proposed threatened. Suitable wolverine habitat is present within the vicinity of the Project and the species is suspected to be present in the Project vicinity (PacifiCorp 2013e). This species has a large home range that the Project would comprise only a small fraction of. The Project consists of ongoing operation and maintenance of existing facilities, which do not contribute to the major threats of wolverines. Therefore, the proposed Project is expected to have ***No Effect*** on North American wolverine.

Canada lynx (*Lynx canadensis*) The Forest Service has identified the Project boundary as within Lynx Core Habitat Area and the species is suspected to be present in the Project vicinity (PacifiCorp 2013e). This species home range is very large and the Project boundary comprises only a very small fraction of their home range. The Project consists of ongoing operation and maintenance of existing facilities which would not require significant lynx habitat modification. Therefore, the proposed Project is expected to have ***No Effect*** on Canada lynx.

Gray wolves *(Canis lupus*) Gray wolf habitat is present within the Project area and the species is suspected to be present (PacifiCorp 2013e). These species have large home ranges that the Project would comprise only a small fraction of their home range. The Project consists of ongoing operation and maintenance of existing facilities and does not propose significant changes to habitat or to their available prey base. Therefore, the proposed Project is expected to have ***No Effect*** on gray wolf.

3.3.6 Recreation and Land Use

Affected Environment

The Project Scoping Document identified the following two topics related to recreation that needed to be examined in recreation licensing studies:

1. The adequacy of existing recreation facilities and public access within the Project boundary to meet current and future (over the term of a new license) recreational demand and

2. Effects of the Project on the recreational experience of users accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness

The comment letter from the Forest Service responding to the pre-application document, the scoping document, and the study request letter that was sent to the FERC, dated June 23, 2011, disagreed that the first topic was an important topic associated with the relicensing of the Wallowa Falls Hydroelectric Project (Forest Service, 2011). The Forest Service stated at that time that there are adequate recreation opportunities and facilities in the Project area, including an adequate supply of trails, but did request that a winter use study of the Project forebay access road be conducted. The forebay access road is used in the winter by recreationists to access the WWNF and Eagle Cap Wilderness to avoid avalanche prone areas along the East Fork Wallowa Trail. A winter use count was conducted for the forebay access road, and its results are discussed in Section 2.2.2: Recreational Use Patterns. The Forest Service also expressed concerns about the user-created trails on the slope west of Pacific Park Campground that provide unregulated access to the WWNF and the PacifiCorp land above the West Fork Wallowa River Gorge. One of the main concerns expressed by the Forest Service was that people using the user-created trails to access the WWNF were not completing wilderness permits and, thus, were not being counted, and use of the WWNF and Eagle Cap Wilderness was being under represented. Because of this concern, the Forest Service requested that a summer use count of the main user-created trail be conducted. A summer use count was conducted, and its results are discussed in Section 3.3.6.1, Recreational Use Patterns.

The comment letter from the National Park Service (NPS) that responded to the pre-application document, the scoping document, and the study request letter that was sent to the FERC dated June 23, 2011, contained several items related to recreation (NPS, 2011). The NPS suggested studying the capacity of the Project to "include opportunities to create or enhance walking trails and scenic viewpoints." Proposed measures developed for the Project related to trails (including upgrading a trail to an area on the ridge west of Pacific Park Campground that offers multiple views of the area) and interpretive signage reflect the suggestions of the NPS.

The topics examined in this document respond to the comments expressed by the Forest Service and NPS, as well as topics uncovered during the development of the Recreation Resource Technical Report (PacifiCorp, 2013f). The topics that are addressed include the following:

1. The adequacy of the existing supplies of recreation facilities and public access to recreational resources in the Study Area and how the proposed Project would affect adequacy and access.
2. Existing recreational use patterns in the Study Area and how the proposed Project would affect use patterns.
3. Likely future recreational demands in the Study Area and how the proposed Project

would support or hinder future demand.

4. Effects of the Project on the recreational experience of users accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness.

The Study Area for recreation is located south of Wallowa Lake and encompasses an area approximately 1 mile around the FERC Project boundary. The area includes PacifiCorp-owned and -managed lands; other private lands with various land uses, including recreation and tourism support; PacifiCorp lands leased to the State of Oregon for the Wallowa Lake State Park Maintenance Facility and the Little Alps Day Use Area; Wallowa Lake State Park; and National Forest System (NFS) lands managed by the WWNF.

Recreation Supply and Access

The south end of Wallowa Lake is a developed resort community that contains a wide array of public and private recreation attractions. Major public attractions include Wallowa Lake State Park, which is the tenth-most visited state park in Oregon (Oregon Live, 2012), the WWNF, and Eagle Cap Wilderness. Private-sector attractions and recreation facilities include the PacifiCorp-owned Pacific Park Campground, miniature golf courses, bumper cars, Wallowa Lake tram, horse outfitters, restaurants, camps, RV parks and campgrounds, and lodges. There are also many single-family residences in this area, some of which are used as vacation homes or vacation rentals. The following highlights the recreation facilities in the Study Area.

Recreation Facilities on PacifiCorp Project Land

Two primary types of recreational activities are supported on Project lands—camping and trail use. Camping occurs on eight campsites at Pacific Park Campground (Table 30). The campsites are less formal and generally larger than campsites at Wallowa Lake State Park and nearby private campgrounds and provide a more rustic type of camping experience that many campers who return to the campground year after year prefer. Most campsites at Pacific Park Campground have areas to park more than one vehicle, electricity, established campfire rings (metal), water, and trash containers. Two vault toilets are located in the campground, but many campers appear to use the flush toilets that are located a short distance beyond the Project boundary at the Little Alps Day Use Area. The campground and Little Alps Day Use Area are currently separated by the northern-braided tailrace channel and formerly intermittent barbed-wire fence. To cross the 2- to 3-foot-wide (0.6 to 0.9 m) tailrace channel users have installed logs, boards, or rocks at several locations. Much of the barbed-wire fence was knocked over or taken down by people travelling between the two areas. All remnants of barbed-wire fence were removed in the summer of 2013.

The overall condition of Pacific Park Campground is fair, but the boundaries of campsites can be confusing as can knowing where to park (there has been some site damage from unregulated vehicle parking). The lack of signage (or difficulty seeing signs) at the campsites

and at the entrance to the campground contributes to some confusion over what entity owns and manages the campground, how to contact the managing entity, and what the campground is when looking at it from nearby areas. Current management issues, such as when the gate to the campground is locked, restroom sanitation and odor, and trash removal, were mentioned as issues in a survey that was conducted of campers in 2011 (see Section 3.3.6.1, Recreational Use Patterns). Additionally, there are no ADA-compliant facilities at the campground or at Little Alps Day Use Area.

A series of user-created trails that originate next to the campground wind their way up the hillside west of the campground to a ridge overlooking the West Fork Wallowa River. Some of the trails fade a short distance from the campground, and others continue up the hillside and connect with other user-created trails on the ridge, including an established user-created trail that travels south to the boundary of the WWNF and intersects with the Chief Joseph Mountain (WWNF Trail No. 1803) and West Fork Trails (WWNF Trail No. 1820). Other user-created trails on the ridge head north to an area that contains a rock outcrop that provides spectacular views of Wallowa Lake and West Fork Wallowa River Gorge. Many of the user-created trails, particularly on the slope between the ridge and Pacific Park Campground have damaged vegetation, created eyesores, and added confusion to recreationists attempting to follow them. The lack of a single trail entering the WWNF has made it difficult for the WWNF to track how many people enter the Eagle Cap Wilderness from these trails.

The forebay access road is another Project feature that is used by recreationists. Some use it as an alternative to the East Fork Trail, particularly backcountry skiers and snow-shoers. The forebay access road and the main WWNF access trail follow the same route south of the Wallowa Lake Trailhead for several hundred feet through PacifiCorp land before diverging on PacifiCorp land. The lack of signs (or difficulty seeing them) in this area can make following the correct trail difficult for people. During site visits, several parties asked PacifiCorp staff and consultants for assistance finding trails. After leaving the route shared with the main WWNF access trail, the forebay access road turns east and steeply winds its way up the north side of the East Fork Wallowa River Canyon to the Project forebay area. Approximately 400 feet (121.9 m) downstream from the Project dam, a connector trail crosses over the Project bypassed reach and connects with the East Fork Trail (WWNF Trail No. 1804). The connector trail allows recreationists to avoid the Project forebay area and avoid crossing over the spillway catwalk (and its 36-inch-high locked gate) to access the East Fork Trail. The part of the side trail immediately east of the bridge over the Project bypassed reach is frequently muddy. Hikers seeking to avoid the mud have damaged nearby vegetation and made the trail area even muddier.

Table 30. Recreation Facilities in the Study Area

Facility	Campsites	Other Features	Notes
PacifiCorp			
Pacific Park Campground	Approximately eight locations for camping	Two vault toilets, water, and electricity	Campsite locations are somewhat flexible and the current management company is experimenting with creating more space and privacy between sites.
Oregon Parks and Recreation Department			
Wallowa Lake State Park	201 (89 non-hookup) campsites, 2 yurts, 3 group tent areas, and 1 hiker/biker area	RV dumping station, restrooms, showers, water, picnic areas, group picnic areas, boat launch, and marina	
Little Alps Day Use Area	N/A	Restrooms (with water), 5 picnic tables, and 2 campfire pits	
Wallowa-Whitman National Forest			
Wallowa Lake Trailhead	N/A	Trail	Located on PacifiCorp property next to the Joseph-Wallowa Lake Highway turnaround and managed by the WWNF, this trailhead provides access into Eagle Cap Wilderness for hikers, commercial outfitters, equestrians, and others. It includes a sign and registration station. Parking for the trailhead is along the west side of Joseph-Wallowa Lake Highway (east side is for horse trailers – mostly associated with outfitters).
East Fork Trail (No. 1804)	N/A	Trail	Part of the trail passes through PacifiCorp property and is managed under easement by the WWNF. The trail provides access up the East Fork Wallowa River to Aneroid Lake and Basin and Tenderfoot and Polaris Passes. The trail is 11 miles one way.
West Fork Trail (No. 1820)	N/A	Trail	Part of the trail passes through PacifiCorp property and is managed under easement by the WWNF. It provides access up the West Fork Wallowa River into the Eagle Cap Wilderness to Hawkins Pass and other trails. The trail is 12 miles one way.
Chief Joseph Mountain Trail (No. 1803)	N/A	Trail	Part of the trail is located on PacifiCorp property and is managed under easement by the WWNF. It provides access to Chief Joseph Mountain and Chief Joseph Basin.

Facility	Campsites	Other Features	Notes
			The trail is 7 miles one way.
Private Sector Facilities			
Scenic Meadows RV Park	16 RV spaces with hookups and 2 tent spaces	Showers, restrooms, water, and electricity	
Eagle Cap Chalets and Park at the River	48 full hookup sites and overflow area	Showers, restrooms, and laundry facilities	
Nonprofit Facilities			
Boy Scout Camp			This camp is owned by Blue Mountain Council of the Boy Scouts of America called Wa-La-Moot-Kin-Lodge.
Wallowa Lake Camp			This camp is owned by the United Methodist Church.

Source: Wallowa Lake Tourism Committee, 2012.

The Wallowa Lake Trailhead is located on PacifiCorp property on the east side of the Joseph-Wallowa Lake Highway terminus. This trailhead is where people entering the Eagle Cap Wilderness register and is near the beginning of the route used by both the forebay access road and initial WWNF-managed access trail that leads to the East Fork and West Fork Trails (both of which start on PacifiCorp land before entering the WWNF).

Wallowa-Whitman National Forest

The WWNF is located in the northeast corner of Oregon and spills into western Idaho. There are no developed WWNF campgrounds within the Study Area. The primary draw of WWNF visitors to the Study Area is the nearby Eagle Cap Wilderness. There are approximately 535 miles of trails within the 350,461-acre wilderness. To access the Eagle Cap Wilderness from the Wallowa Lake area, recreationists pass through PacifiCorp land on trails developed and maintained by the Forest Service. Most begin their trip at the Wallowa Lake Trailhead, which is also located on PacifiCorp land. People travelling to the wilderness via the East Fork Wallowa River Canyon take the East Fork Trail (WWNF Trail No. 1804), which crosses over and near the Project penstock at several locations and passes near the Project dam and forebay area. Recreationists accessing the wilderness via the West Fork Wallowa River Canyon (and going to Chief Joseph Mountain) also start at the Wallowa Lake Trailhead. Instead of branching off to the left to access the East Fork Trail, they continue up the ridge south of Pacific Park Campground where the West Fork Trail intersects with the Chief Joseph Mountain Trail and the user-created trails on the ridge west of Pacific Park

Campground described previously. The lack of signage (or difficulty seeing signs) at the intersection of these trails (plus the presence of the user-created trails) can make finding the right trail challenging.

Oregon Parks and Recreation Department

The OPRD manages the 166-acre Wallowa Lake State Park, which is located approximately 0.75 mile north of the FERC Project boundary. The park contains 210 campsites, 89 of which are non-hookup sites, 3 group camping areas, 1 hiker/biker campsite, 2 yurts, picnic areas, a swimming area, a marina that provides overnight moorage, a concessionaire building, boat rentals, and a boat ramp. In addition to the main park, OPRD manages the 3.6-acre Little Alps Day Use Area, which is adjacent to the Project boundary. PacifiCorp has leased this area to OPRD for recreational use since 1954. The park includes a restroom with cold running water (but no electricity), five picnic tables, several trash receptacles, two fire pits, and several water faucets. The east side of the day use area is adjacent to the portion of the Joseph-Wallowa Lake Highway where people entering the Eagle Cap Wilderness park their vehicles. Most people visiting the Little Alps Day Use Area are starting or ending their hikes into the WWNF and/or Eagle Cap Wilderness. The Little Alps Day Use Area has several small signs that identify it by name, but it is difficult to understand what service the area provides to visitors. The distinction between the day use area and Pacific Park Campground is also not clear.

Private and Nonprofit Sector Recreation Facilities

Two private sector facilities provide camping resources within the Study Area. The Eagle Cap Chalets and Park at the River (the same facility) contain 48 full hookup sites as well as an overflow area. The Scenic Meadows RV Park consists of 16 RV spaces with hookups and 2 tent spaces. Both facilities provide restrooms, water, and other amenities. Two other areas near the Project are used by nonprofit groups for infrequent recreation activities. The Blue Mountain Council of the Boy Scouts of America own approximately 90 acres on the west side of the West Fork of the Wallowa River and 7-acres on the east side of the river. As a result of a series of events (i.e., fires and flooding), it is no longer an active Boy Scout camp or recreation resource; however, it is still used to a limited degree. Wallowa Lake Camp is owned and operated by the United Methodist Church. This camp contains camp-related structures. Historically, the camp was much bigger, but much of its land was subdivided and sold as needed to generate income for the camp (OPRD, 2001).

Recreational Use Patterns

This section focuses on describing recreational use patterns of Pacific Park Campground, winter use of the forebay access road, and summer use of user-created trails located on PacifiCorp land to access the WWNF, and use of Oregon Parks and Recreation Department managed facilities in the Study Area.

Pacific Park Campground

To determine use patterns at Pacific Park Campground, two sources were consulted. The most current source was provided by the property management company that manages the campground for PacifiCorp. The property management company provided data on the number of campsites that were reserved online (see Table 31). Seasonal use patterns at Pacific Park Campground are similar to those of other attractions in the Study Area. Use typically starts out slowly during the late spring months and rapidly increases during the peak months of July and August. After August or mid-September, use drops off considerably. The number of people who camped at Pacific Park Campground in the years between 2010 and 2012 ranged between 544 and 764.

Table 31. Number of Campsites Reserved at Pacific Park Campground

Year	5/1 to 5/14	5/15 to 5/31	6/1 to 6/14	6/15 to 6/30	7/1 to 7/14	7/15 to 7/31	8/1 to 8/14	8/15 to 8/31	9/1 to 9/14	9/15 to 10/1	Total	Estimated Number of Recreation Days (assume 4 people on average per site)[1]
2012	0	5	0	13	34	31	24	30	12	3	152	608
2011	0	3	3	9	16	41	31	18	12	3	136	544
2010	0	4	6	8	50	43	30	32	13	5	191	764

[1] Estimate supplied by property management company that manages Pacific Park Campground for PacifiCorp based on staff observations.

The property management company reported that on most summer weekends—and almost all summer weekdays—there were campsites available. On long summer weekends such as Labor Day and some Fourth of July weekends, all campsites might be taken. In general, however, it appears that either there is not a shortage of campsites at Pacific Park Campground, or that the facility is under-utilized during most of the summer. In its comment letter on the PLP, OPRD stated that camping facilities at Wallowa Lake are full most days in July and August (and the park frequently turns away customers) and is frequently full in late May, June and early September (OPRD, 2013). OPRD believes that the reason the Pacific Park Campground is not more frequently full is due to sporadic management, a limited reservation policy, and a lack of communication with Wallowa Lake State Park (which could send campers to Pacific Park Campground with better communication).

A second source of visitation data was obtained from the FERC-required Form 80 Recreation Reports from 2003 and 2008. The annual number of recreation days at the campground between May and September in 2003 and 2008 were estimated at 556 and 541, respectively (see Table 31). These totals are similar to those estimated for the years between 2010 and 2012 and displayed in Table 32.

Table 32. Form 80 Recreation Report Data: Overnight Stays at Pacific Park Campground

		Recreation Days	
Year	Recreation Season	Annual Total	Peak Weekend Average
2003	May 24, 2003 to October 1, 2003	556	264
2008	May 1, 2008 to September 30, 2008	541	60

The Forebay Access Road, User-Created Trails, and Access into the WWNF

In addition to Pacific Park Campground, recreationists use PacifiCorp lands to access the WWNF and Eagle Cap Wilderness. The Forest Service requested that trail surveys be conducted to obtain information that would assist in better understanding how recreationists use routes on PacifiCorp property to access the WWNF and Eagle Cap Wilderness. People starting their trips into the Eagle Cap Wilderness from the Wallowa Lake Trailhead (which comprises most users) are required to register. By using other routes and/or not registering, the number of people estimated to use the wilderness each year is underrepresented. Underrepresentation can have funding consequences for the WWNF because budgets for managing wilderness areas are frequently related to use levels.

In its comment on the pre-application document, the comments on the scoping document, and the study request letter sent to the FERC dated June 23, 2011, the Forest Service provided data from 3 years related to use at the Wallowa Lake Trailhead (Forest Service, 2011). The Forest Service reported that, in 2005, 1,765 permits were filled out and deposited in the permit deposit box at the Wallow Lake Trailhead between January 14 and November 11. Assuming a party size of 2.7 people and a compliance rate of filling out permits of 85 percent, the estimated number of people departing the trailhead to access the Eagle Cap Wilderness was estimated at approximately 5,500. Most were hikers, with 110 estimated to be using stock animals. Between January 1 and November 26, 2007, 1,730 permits were submitted, and approximately 5,400 people were estimated to have entered the area. In 2010 (between March 23 and December 8), 1,701 permits were turned in, and approximately 5,300 people were estimated to have entered the Eagle Cap Wilderness. The 3 years of estimates indicate very consistent use of the Eagle Cap Wilderness.

The Forest Service felt that winter counts of the forebay access road use would provide useful information. During the winter, some recreationists using skis and snowshoes follow the forebay access road on their way into the WWNF rather than the East Fork Trail. To better understand use patterns associated with winter use of the forebay access road, a winter use survey using a laser-beam counter was conducted between late January and March 2012 to count recreationists using the road (see Table 33).

Table 33. 2012 Winter Recreational Use of the Forebay Access Road

Dates	1-29 to 2-6	2-7 to 2-13	2-14 to 2-20	2-21 to 2-29	March	Total
Counts	27	12	21	20	67	147

Note: Because some people using the forebay access road in the winter return via the West Fork Trail, it was assumed that half of the people counted returned a different way and were not double counted. Therefore the actual counts were multiplied by 75 percent to estimate winter use of the forebay access road. .

Snow came late to the Study Area in the winter of 2011-2012, and as such, counts did not begin until late January 2012. A total of 147 recreationists were estimated to have used the forebay access road between January 29, 2012, and March 31, 2012 (see Table 33). The number of people counted in February (plus January 29) was 60, which is similar to the number for March (67). Winter use in the Study Area is lighter than summer use, but the forebay access road is an important resource for winter recreationists travelling to the Eagle Cap Wilderness.

During the rest of the year, recreationists also access the WWNF (and Eagle Cap Wilderness) via the forebay access road. Most recreationists, however, use the East Fork and West Fork Trails to access the WWNF. However, some recreationists enter the WWNF via user-created trails located on PacifiCorp land west of Pacific Park Campground. After leaving the campground and climbing up to a ridge, some people head north on user-created trails to areas overlooking the West Fork Wallowa River Gorge and Wallowa Lake, and others travel south on user-created trails to the West Fork and the Chief Joseph Trails. The Forest Service requested that a summer survey be conducted to provide information related to the use of the user-created trails. The laser-beam counter used for the winter count was moved next to the most prominent (the "main") user-created trail west of the Pacific Park Campground. User counts were conducted between May and the end of October 2012 and are presented in Table 34.

Table 34. Summer and Fall Use of the "Main" User-Created Trail West of Pacific Park Campground.

Dates	5-21 to 6-10	6-11 to 6-25	6-26 to 7-10	7-11 to 7-27	7-28 to 8-7	8-8 to 8-30	8-31 to 9-20	9-20 to 9-30	10-1 to 10-31	Total
Counts	495	332	425	335	384	530	306	136	144	3,087

The number of people counted was not divided in half so some "double counting" of people no doubt occurred. The number of people counted indicates that the "main" user-created trail is popular and that use seemed to be highest during popular summer weekends and August. Because of the number of trail options in this area, it was difficult to determine which trails people used to access the ridge and what their destinations were once on the ridge. For some people, the ridge was their target destination. Others likely traveled a loop via the ridge that returned to the campground area along the West Fork Trail and never entered the WWNF. Some no doubt, used the "main" user-created trail as a short-cut to the West Fork and Chief Joseph Mountain Trails and/or to avoid the dusty lower part of the West Fork Trail and did enter the WWNF. Responses from Pacific Park Campground users who were surveyed suggest that many did enter the Eagle Cap Wilderness. Of the 19 parties who responded, 13

(68 percent) reported using trails into the WWNF during their stay. A total of 46 percent reported hiking on the Chief Joseph Mountain Trail, 26 percent on the East Fork Trail, and 20 percent on the West Fork Trail. It is clear that a number of people use the user-created trails during the summer and fall and that controlling use and upgrading the trails might be warranted. Unless a registration station for people using the user-created trails near the Pacific Park Campground is established, it would remain difficult to determine how many people enter the Eagle Cap Wilderness via the user-created trails.

Wallowa Lake State Park

OPRD provided traffic count data to PacifiCorp to use as an estimate for monthly use patterns at Wallowa Lake State Park. Traffic counts were conducted at two locations in the south Wallowa Lake area. Traffic counts at one area (near the Wallowa Lake State Park maintenance facility) is somewhat useful for this assessment because it includes traffic counts along a portion of Joseph-Wallowa Lake Highway that included people driving to the Little Alps Day Use Area and the Wallowa Lake Trailhead, people parking along the Joseph-Wallowa Lake Highway, people using the Joseph-Wallowa Lake Highway turnaround, and people driving to Pacific Park Campground. (Table 35). Although it is not possible to know how the people in the counted vehicles are distributed in terms of where they go after crossing the counter, the counts do depict patterns related to the seasonality of use and changes in use over a 5-year period. As would be expected, the greatest number of vehicles driving past the counter occurred in July and August. The number of vehicles increased each year from 2008 to 2011 (the count for 2012 has not been provided by OPRD).

Table 35. 2008 to 2012 Traffic Counts Near Wallowa Lake State Park Maintenance Facility—Location 2.

Year	Jan.	Feb.	Mar.	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total
2012	3,460	1,690	1,669	441	3,288	5,466	16,854						32,868
2011	2,026	1,956	3,010	1,517	5,617	20,007	17,730	31,974	9,155	3,418	2,127	1,777	100,314
2010	1,759	1,978	3,112	1,628	2,907	18,806	35,600	15,549	8,241	1,010	2,255	3,973	96,818
2009	914	1,078	1,921	905	7,117	11,153	28,872	15,077	1,161	3,502	2,379	1,742	75,821
2008	2,000	1,991	1,990	3,485	5,786	9,914	16,576	15,125	8,622	3,532	1,893	2,393	73,307

Note:
Counter was located across the Joseph-Wallowa Lake Highway right after the driveway into the Wallowa Lake State Park maintenance facility.

In its comment letter on the PLP OPRD stated that Wallowa Lake State Park has an annual count in excess of 516,000 day users and almost 71,5000 overnight campers (OPRD, 2013).

Recreation Demand

The recreation demand analysis included in the Recreation Technical Report was intended to determine how demands for recreation activities of relevance to the Project might change in

the future (PacifiCorp, 2013f). These data were gathered primarily from OPRD's State Comprehensive Outdoor Recreation Plans (OPRD, 2003). A 2011 OPRD-funded statewide survey of Oregon residents regarding their outdoor recreation participation produced data that proved useful for identifying 26 recreational activities that occur within Wallowa County (Rosenbeger, 2012). Most, if not all, of the activities identified in the survey as occurring in Wallowa County, were found to occur within the Study Area, on PacifiCorp lands, and/or within the Project boundary. Of the activities identified as occurring in Wallowa County, the two most popular (car camping with a tent and RV, motorhome, or trailer camping) occur at the Pacific Park Campground. Although many people who camp at Pacific Park Campground are from other areas, there is clearly a demand among Wallowa County residents for camping. The survey also reported a county demand for walking on local streets and trails as well as activities such as horseback riding, big game hunting, wildlife and nature observation, photography, fishing, backpacking, picnicking, running on trails, cross-country skiing, and snowshoeing.

In addition to Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP) documents, the Wallowa County State Parks Master Plan was examined. The master plan was adopted by OPRD in 2001 and was developed to assist and direct the planning of three OPRD units located within Wallowa County - Minam State Recreation Area, Wallowa Lake Highway State Scenic Corridor, and Wallowa Lake State Park (OPRD, 2001). Although the master plan is 12 years old, it contains useful background information about recreation demand. The following results are of relevance to the Project in terms of how it might be able to help meet future demands:

- There is demand for additional group camping facilities.
- There is demand for additional short trails or loops close to campgrounds with connections to wilderness areas.
- There is demand for more amenities and choice for types of overnight accommodations.
- There is demand for additional disabled accessible sites.

3.3.6.1 Environmental Effects

The following assesses the effects of the proposed Project and its associated proposed measures for recreation on; 1) recreation supply and access, 2) recreational use patterns, 3) future recreation demand and 4) effects of the project on the recreational experience of users accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness.

As described in the PLP, PacifiCorp and the OPRD are currently discussing the potential acquisition by OPRD of long term usage rights (through a lease, easement, or other agreement) to PacifiCorp lands adjacent to and within the proposed FERC Project boundary. The lands under consideration for this off-license-agreement include: the existing Wallowa State Park maintenance facility; Wallowa State Park-Little Alps Day Use Area, Pacific Park Campground; and all or some portion of, the slope and ridge between Pacific Park

Campground and the West Fork Wallowa River Gorge. This section discusses the effects of the proposed Project on recreation resources. PacifiCorp is prepared to implement the proposed measures analyzed below regardless of the outcome of the off-license agreement discussions. A detailed description of the proposed recreation enhancement measures, schedule, and management goals, objectives and responsibilities is provided in Appendix M, Recreation and Aesthetic/Visual Resource Management Plan (RRMP).

Once the tailrace reroute pipeline is constructed and put into operation, the existing tailrace channels, which discharge to the West Fork Wallowa River, will no longer be needed for Project operations. The main tailrace channel currently located on the south side of the Pacific Park Campground road will be retained to provide stormwater management and drainage in the park. The braided tailrace side channels on the north side of the park road will be reclaimed and restored to match surrounding contours.

The braided tailrace side-channels resemble a creek and make an interesting feature in the campground. While the elimination of this feature would result in some loss of aesthetic character, restoring the area to a more natural contour would make accessing adjacent areas (particularly the Little Alps Day Use Area) easier and safer. The main tailrace channel has existed within the campground since its initial development with no recorded safety issues or other recreation use concerns. Retaining it would promote drainage in the campground area, provider a feature of interest, and be a positive effect to recreation use in the Campground.

Regardless of the outcome of the off-license agreement with OPRD, PacifiCorp proposes to continue coordination with the Forest Service and OPRD in providing recreation opportunities on PacifiCorp lands on the east side of the Joseph-Wallowa Lake Highway and within the FERC Project boundary. The effects of those proposed measures are analyzed below.

Effect of the Proposed Project on Recreation Supply and Access

Although developed recreational facilities located within the Project boundary are generally in fair to good condition, and recreation resources within the Project boundary and within the Study Area are accessible to the general public, there are opportunities to improve recreational features located within the Project boundary, improve the experience of recreationists using these features, and protect areas that have been damaged by recreational use. The following describes proposed measures that were developed for recreational features located within the Project boundary and describes how the proposed measures would address concerns related to recreation supply and access. Many of the proposed measures were developed by a group of PacifiCorp, Forest Service, and OPRD staff as a result of a series of meetings and site visits. Additional proposed measures that are included in the aesthetic and visual resource section (Section 3.3.7) would improve the experience of recreationists in the vicinity of the Project. Unless otherwise stated, the proposed measures would be implemented within 5 years of receiving a new Project license.

The following measures will be implemented in the vicinity of the Pacific Park Campground and the hillside and ridge west of the campground.

- Install a new entry sign at Pacific Park Campground. The existing sign near the entrance to the campground is not easy to find and/or see, and information on it can be difficult to understand. The existing sign will be replaced with a new sign designed to meet FERC Part 8 signage requirements as well as Forest Service and PacifiCorp design standards. The sign will inform the public of the campsite reservation system. Note that signs designed to PacifiCorp standards have been installed at other PacifiCorp projects located on National Forests and have been approved by the National Forests in which they are located.

- Construct a campground host area at Pacific Park Campground. A campground host facility would be located near the campground's entrance where there is currently a storage shed. An approximately 10-foot by 30-foot (3 by 9.1 m) compacted gravel pad for a trailer or RV will be built and connections for electricity, water, and sewage hookup to a county approved septic system made. Having a campground host will help to disseminate information, maintain the campground, and ensure that campers and others are complying with campground rules.

- Replace the two existing vault toilets with an ADA compliant restroom facility that will have flush toilets and running water (cold). There is currently no ADA accessible restroom facility at Pacific Park Campground (or at the Little Alps Day Use Area), so the new facility will be ADA-accessible.

- Improve campsite identification signage. To make finding campsites posts/signs with campsite numbers will be placed at the entry to each campsite to indicate the campsite number.

- Upgrade-restore tent/vehicle pads at Pacific Park Campground. Restore camping pads that have eroded with new compacted gravel and wood ties where necessary.

- Remove logs, stumps, and rocks located in inappropriate areas throughout the campground will be relocated or removed.

- Construct a new access trail to the ridge west of Pacific Park Campground. The maze of user-created trails on the slope west of Pacific Park Campground is

confusing and users have damaged vegetation along the slope. A new, formalized access trail that will follow (with some adaptation) the "main" existing user-created trail will begin just south of Pacific Park Campground and provide access to the ridge. Once on the ridge, the main trail will connect with an existing well established user-created trail that provides access to the south to the WWNF West Fork (#1820) and Chief Joseph Mountain (#1803) trails and access to the north to an area at the north end of the ridge that has views of Wallowa Lake and the West Fork Wallowa River Gorge.

- Decommission and restore user-created trails on the slope between Pacific Park Campground and the ridge to the west. Debris (e.g., logs, branches) would be placed at the beginning of the user-created trails on the slope west of Pacific Park Campground to block access to them. Small signs would be posted along the trails asking the public to support vegetative restoration efforts by staying off the restoration sites and using designated trails (this message would also be at the new sign and wilderness registration facility – see below).

- Install sign and a wilderness registration station at the base of the new formalized access trail to ridge**.** A sign with a Forest Service wilderness registration facility that meet Forest Service and PacifiCorp sign standards would be located at the beginning of the new access trail from Pacific Park Campground to the top of the ridge to the west. The sign will include a map that would depict the trails on the ridge and their connection to the West Fork and Chief Joseph Trails and a surface for posting wilderness condition reports and other WWNF information. The sign/station will explain what is required for entry into the Eagle Cap Wilderness, and include a box for registering Forest Service wilderness permits and collecting fees will be placed next to the sign.

PacifiCorp will implement the following improvements in the vicinity of the Project powerhouse, forebay area, the forebay access road, and the terminus of the Joseph-Wallowa Lake Highway:

- Replace the Wallowa Lake Trailhead sign and wilderness registration station. A new trailhead sign will replace the existing sign and be similar in design to other signs that will be developed as part of these proposed measures. The sign will be relocated to a new trailhead location in coordination with the Forest Service and will have room for posting Forest Service topical information, maps and a registration station for Forest Service wilderness permits. The sign content will be

developed with Forest Service input.

- A new trail would connect the relocated Wallowa Lake trailhead to the access trails/forebay access road that are used to access the East Fork Wallowa and West Fork Wallowa trails that provide access into the WWNF.

- Replace the existing cable barrier across the maintenance access road near the terminus of the Joseph-Wallowa Highway turnaround with a metal gate.

- Install a three panel interpretive sign at the terminus of the Joseph-Wallowa Lake Highway and current Wallowa Lake Trailhead. A lack of information in the area around the powerhouse and Wallowa Lake Trailhead results in user confusion regarding nearby recreation opportunities (Pacific Park Campground, the Wallowa Lake Trailhead sign, trails into the WWNF, and the Little Alps Day Use Area). To provide information, a three-panel informational kiosk meeting FERC Part-8 requirements will be installed at the end of the Joseph-Wallowa Lake Highway. The sign will also inform the public on topics such as the history of the Project, its components and operation, historical use of the area, and other available recreation opportunities in the general vicinity of the Project. The sign content will be developed with input from interested stakeholders. .

- Install new trail and forebay access/trail signs. The portion of the forebay access road that is also the main WWNF access trail south of the Wallowa Lake Trailhead is not well marked and somewhat confusing for some users. In addition to the improvements to the Wallowa Lake Trailhead described previously, six new trail and/or directional signs would be installed along the portion of the forebay access road and main WWNF access trail. Locations would be established with Forest Service collaboration. An example of an appropriate location is where the forebay access road forks to the left from the main WWNF access trail and heads up a steep slope. A sign at this location could demark the forebay access road and identify other WWNF trail opportunities. Install a new directional sign (near the Wallowa Lake State Park maintenance facility) at the trail used by horse packers to reach the existing access trail to the forebay access road and the WWNF.

- Improve the connection trail between forebay access road and East Fork Wallowa Trail. An existing trail between the forebay access road and the East Fork Trail crosses the bypassed reach on a fairly new wood bridge. To the immediate east of

the bridge, the trail is frequently muddy due to a natural spring nearby, and people have created "new" trails above the mud to avoid it. To remedy this drainage situation, a turn pike drainage structure will be built per WWNF standards.

Recreational Use Patterns in the Study Area and the Relationship of the Project

The use patterns for recreation facilities located on Project lands indicate that most use of the Project's recreation facilities and nearby facilities occur during the summer. Pacific Park Campground helps meet summer demands for camping in the Study Area. As stated previously, Pacific Park Campground offers a different, less developed type of camping experience compared with Wallowa Lake State Park and nearby private campgrounds. Because the campground is not full during most of the summer, and because of size limitations, there is no reason to consider expanding the campground. The current users of the campground seem to be satisfied with it. A survey was sent to campers during the summer of 2011 that had registered to camp online and is described in the Recreation Resource Technical Report (PacifiCorp, 2013f). The survey was completed and returned by 19 parties, which is not a large number of responses but is a sufficient number to provide informational, if not statistically valid, feedback. Following are some of the responses supplied by the respondents:

- The condition of the campground (on a scale of 1 to 10) was rated 10 (excellent) by 21 percent of the respondents, 9 by 21 percent, 8 by 31 percent, 7 by 16 percent, and 4 (low average) by 11 percent.

- The quality of the camping experience was rated 10 (excellent) by 44 percent of the respondents; 9 by 22 percent; 8 by 17 percent; and either 5, 6, or 7 by 5 percent.

- Activities that were enjoyed included day hikes into the WWNF (68 percent participating), fishing (5 percent), photography (42 percent), observing nature (63 percent), and other (37 percent).

The proposed measures for Pacific Park Campground that are described previously in the *Effect of the Proposed Project on Recreation Supply and Access* discussion would not add capacity in terms of numbers of campsites at the campground, but would improve the camping experience for campers, who as indicated above, are already generally satisfied with Pacific Park Campground.

The proposed measures described previously for the user-created trails that originate at Pacific Park Campground would improve the setting of the campground and improve opportunities for trail users. Consolidating the user-created trails into one developed trail that would provide access to the ridge west of the campground, along with improving existing ridge top trails including access to an area (the north end of the ridge) used as a scenic

overlook would provide additional trail opportunities in the Wallowa Lake area. This would be consistent with NPS suggestions for providing more trails and scenic outlooks in the Study Area. Signage associated with the proposed improvements would also improve the experiences of trail users. The confusion regarding the trail system along the ridge and at the intersection of the West Fork and Chief Joseph Trails would be remedied with the suggested sign improvements. Signs and maps would assist people who wish to either simply hike to the ridge, complete a loop hike from Pacific Park Campground to the ridge and back to the Wallowa Lakes Trailhead, and access the WWNF.

The winter trail counts that were taken of the forebay access road indicated that approximately 147 people used the road during the winter (January through March). Although this is not a large number of people, the count clearly indicated that the forebay access road is an important winter recreation resource. The gate at the west end of the catwalk over the spillway (which people currently have to climb over) has been locked historically. To make year-round crossing of the catwalk easier, the gate would be modified to allow pedestrian passage. This action will enhance year-round recreation access in the forebay area and will be particularly beneficial to winter users.

Improvements to the forebay access road/access trail (directional signs) would make easier to follow. Directional and interpretation improvements along the forebay access road and East Fork Trail described in the aesthetic and visual resource proposed measures would improve the recreational experience of people accessing the Eagle Cap Wilderness through Project lands.

Future Recreation Demand and the Project

The recreation opportunities that the proposed recreation measures would primarily improve include those that occur at Pacific Park Campground and on area trails. General types of outdoor recreational activities where there are current demands, and likely future demands, that Project facilities would be able to at least partially meet or supply include walking and/or hiking, horseback riding, big game hunting, wildlife and nature observation, photography, fishing, backpacking, trail running, cross-country skiing and snowshoeing, picnicking, and learning about history.

As described in Section 3.3.6, Recreation Demand, the Wallowa County State Parks Master Plan identified future recreation demands in the Wallowa County area. The following describes the demands that were listed in section 3.3.6 and how the proposed recreation measures would help meet those demands:

- There is demand for additional group camping facilities. Group camping occurs unofficially at Pacific Park Campground and the campground would help (to a small degree) continue to meet this demand.

- There is demand for additional short trails or loops close to campgrounds with connections to wilderness areas. The proposed trail and forebay access road measures would help meet this demand.

- There is demand for more amenities and choice for types of overnight accommodations. The proposed mitigation measures related to improvements at Pacific Park Campground would help meet this demand.

- There is demand for additional disabled accessible sites. The proposed ADA accessible flush toilet would help meet this need.

Effects of the Project on the Recreational Experience of Users Accessing the Wallowa-Whitman National Forest and Eagle Cap Wilderness

The Forest Service expressed concerned that the experience of recreationists travelling to the WWNF and Eagle Cap Wilderness on WWNF trails could be negatively affected by the visual presence of Project components, such as the penstock, trestle, and forebay area (including the dam, spillway, and catwalk), and noise associated with the Project powerhouse. The four proposed mitigation measures described in Section 2.2.3.8, Aesthetic and Visual Resources were developed to reduce potential impacts associated with Project components seen from the East Fork Trail by recreationists. It would not be possible to completely screen views of the Project components from the trail, but implementing the proposed measures would improve the Project's appearance when viewed from the trail. In addition, Forest Service and PacifiCorp staff agreed that adding interpretive signage near the East Fork Trail that explains the Project's history and what the various Project components are would help mitigate the Project's presence to recreationists who might find its presence unexpected on a trail into a wilderness area. As described in Section 3.3.7, Aesthetic and visual Resources, noise from the Project powerhouse can be heard by recreationists using WWNF trails to access the Eagle Cap Wilderness, which was of concern to the Forest Service. Noise readings were taken from around the Study Area in the summer of 2013 (see Section 3.3.7 – Aesthetic and Visual Resources), but ultimately no applicable county, state, or Forest Service standards were found that existing noise levels could be compared with to determine whether there was a noise-related impact (PacifiCorp, 2012g). The Project's presence would continue to be noticed by recreationists using WWNF trails to access the Eagle Cap Wilderness.

3.3.7 Aesthetic and Visual Resources

Resources That Would Not be Affected by the Proposed Action

In its comments on the pre-application and the scoping documents, and study request letter dated June 23, 2011, The Forest Service noted that WWNF visitors can hear noise from the powerhouse for at least the first mile while on three different trails in the WWNF and Eagle Cap Wilderness and that it considered noise a disruption to Forest visitors. The topic of noise was raised at several meetings and during site visits with PacifiCorp, the WWNF, and the Oregon Parks and Recreation Department (OPRD). The attendees were asked to help determine whether there were quantifiable, acceptable levels of noise against which noise associated with the powerhouse could be measured. No applicable county, state, or U.S. Forest Service standards were found. Noise readings were collected from multiple spots in the Project area (including trails in the WWNF) and compared with noise levels generated by various sources (e.g., normal breathing, people talking, rainfall). The results are displayed in Appendix N of this document and in Appendix C of the Visual and Aesthetic Resources Technical Report (PacifiCorp 2013g). Without relevant standards to compare powerhouse generated noise against however, the value of the data is limited as there are no standards for comparison. As part of the Recreation Resource Study, campers at the Pacific Park Campground were e-mailed a questionnaire to assess their experience camping at Pacific Park and using area trails. A primary purpose of the questionnaire was to determine whether powerhouse generator noise was noticed by the respondents and, if so, if it interfered with their experience. Of the 19 parties that responded, one specifically mentioned “machinery” (the generator) but stated that s/he heard it as they first started out on the trail and that it did not affect their trip. For the reasons stated above, noise associated with the powerhouse will not be evaluated.

Affected Environment

Issues related to aesthetic and visual resources focused on two parts of the Project area: the area within the WWNF that can be viewed from the East Fork Trail and the area near the Project powerhouse and terminus of Joseph-Wallowa Lake Highway. Consistency with the VQOs of the WWNF Forest Plan is also an issue to address.

The portion of the Project within the WWNF is located in the steep, narrow, heavily timbered canyon of the East Fork Wallowa River. Access through the canyon into the WWNF is via the East Fork Trail and the Project forebay access road. On most parts of the trail the visibility of Project facilities is limited. However, the Project dam and forebay complex, can be seen from along approximately 100 to 200 feet (30.5 to 61 m) of the East Fork Trail. The openness of the area near the dam and forebay is different than most areas found along the tree-lined trail. The most visible Project facilities from the trail are the waters of the 0.2 surface-acre forebay (which has the appearance of a small pond); the buttressed, rock-filled timber crib dam that is 125 feet (38.1 m) in length and 18 feet (5.5 m) in height; and the 30-

foot-wide (9.1 m) spillway over which an aluminum catwalk has been installed to provide access over the dam. A wood deck over the forebay that supports the intake structure control wheels is located just beyond the southeast side of the catwalk. The laydown and storage area is located on the southeast side of the forebay and consists of a cleared area, a storage shed (which, due to its cabin-like appearance, has visual interest), and piles of materials (e.g., old wood pipes, shakes, and other miscellaneous materials). The area appears as a clearing with a "cabin" when viewed from the East Fork Trail. When seen at a closer distance from the forebay access road, the area has more of a utilitarian appearance.

The WWNF Forest Plan uses the Visual Resource Management (VRM) system for managing its visual resources (Forest Service, 2012). Five classifications—the VQOs—are used in the VRM to provide management direction in terms of how much the landscape within a national forest can be altered and still meet Forest Plan direction for visual resources. The part of the Project that is within the WWNF has been classified with a VQO of "retention," which is the second most restrictive VQO in terms of permissible changes to the viewed landscape. In the retention VQO, human activities are not visually evident, and the valued (desired) landscape character appears intact or unaltered.

The portion of the Project outside of the WWNF near the Project powerhouse is the most visible part of the Project, but even it is not particularly visible. The Project powerhouse is situated in a relatively flat area approximately 1.2 mile south of Wallowa Lake that is surrounded by steep terrain and numerous trees. This portion of the Project is located on PacifiCorp land and includes the beginning of the forebay access road, substation, powerhouse, tailraces, and Pacific Park Campground. The area where the powerhouse and substation are located is approximately 16,500 square feet (5,029 sq. m) in size. The powerhouse is approximately 35 feet (10.7 m) wide, 45 feet (13.7 m) long, and 18 feet (5.5 m) high. The metal building is a light yellow-green color and has a functional, industrial appearance. The perimeter of the facility is surrounded by a chain-link fence topped with constantine wire (i.e., a roll of barbed wire). These facilities are not visible over a great distance (less than approximately 0.25 mile (0.4 km)) due to topography and vegetation. The primary viewers in this area are campers at the Pacific Park Campground, people using trails located on PacifiCorp land as they make their way into the WWNF, recreationists using the Little Alps Day Use Area, and people (mostly motorists) turning around at the terminus of the Joseph-Wallowa Lake Highway. The area near the terminus of the Joseph-Wallowa Lake Highway contains the Project facilities mentioned above, the entry to the Pacific Park Campground, the Little Alps Day Use Area, the Wallowa Lake Trailhead (which includes a large wood kiosk with a wilderness permit box), and ample parking for the vehicles of hikers and equestrians (trucks and horse trailers). The substation is adjacent to the southeast side of the powerhouse. Four wood poles approximately 35 feet (10.7 m) in height support the 7.2-kilovolt transmission line that connects the substation with the powerhouse.

3.3.7.1 Environmental Effects

Project Facilities Located in the WWNF and Consistency with the WWNF Forest Plan

In the comment letter sent by the Forest Service responding to the pre-application document, the FERC scoping document, and study request letter that was sent to the FERC dated June 23, 2011, the Forest Service expressed concerns related to the appearance of the Project forebay, dam, catwalk, and penstock. The Forest Service letter stated that these Project facilities are visual intrusions to East Fork Trail users due to the materials of which they are made (Forest Service, 2011). The letter also stated that, from several locations along the trail where it is visible, the penstock detracts from the natural quality of the area. In addition to the Project forebay, dam, and catwalk and penstock identified by the Forest Service in the June 23, 2011, scoping letter, PacifiCorp and Forest Service staff identified several other Project facilities that currently detract from the area's appearance when viewed from the East Fork Trail. These additional facilities are the intake structure housing, the dam laydown and storage area on the east side of the forebay, and the area adjacent to and between the East Fork Trail and the west side of the dam and spillway catwalk and forebay. The portion of the Project where these facilities are located does not meet the assigned VQO of retention. After a series of meetings with Forest Service staff (including a site visit), an aesthetics and visual resource management program was developed that would improve the appearance of the current condition of this portion of the Project. The specific proposed measures are described below:

- Improve the forebay intake structure by installing wood shake-siding to the exterior and roof of the equipment house. After discussions with Forest Service staff, it was agreed that painting the brushed-aluminum catwalk (the color of which had previously been pointed out as being an issue) or replacing the relatively new structure with a nonaluminum structure would not be practical or result in enough of a visual improvement to justify the expense. Therefore, it was dropped from consideration. Wood shakes would be attached to the intake structure-equipment house's exterior and roof (which are currently plywood) so that they would be similar in appearance to the storage structure that can be seen on the east side of the forebay; the storage structure currently has the appearance of a rustic cabin;

- Improve the laydown and storage area on east side of forebay. PacifiCorp currently uses the east side of the forebay within the FERC Project boundary to store materials needed for maintaining the dam, forebay, and other facilities. Much of the materials currently in this area would be removed and consolidated behind the existing storage structure mentioned previously so that it would not be seen from the East Fork Trail;

- Install interpretive sign at the west side of forebay. Screening the Project facilities that can be seen from the East Fork Trail with vegetation was considered, but due to the FERC requirements regarding keeping areas near dam free of vegetation, this idea was abandoned. Instead, a hydroelectric project interpretive sign will be installed along the East Fork Trail at the forebay including a map of the local trail system. Information related to the Eagle Cap Wilderness could also be included;

- Enhance the upper penstock trestle and penstock pipe by painting them a uniform dark color in consultation with the WWNF. The portion of the penstock just north (downstream) of the forebay dam and spillway that is supported by a timber trestle and visible from several locations along the East Fork Trail would be treated to make it more visually recessive. The most visible parts of this feature are the painted metal penstock, concrete and rock support structures, and support timbers that are different colors than the other support timbers. The penstock would be painted a uniform color in consultation with the WWNF. The concrete support structures would be stained with a darker gray color that would be similar to that of nearby rocks.

With the proposed measures described above, the Project facilities would still be "visually evident" from the East Fork Trail and would not meet a VQO of retention. Although the proposed measures would not meet a VQO of retention, they would improve the existing appearance of the Project facilities viewed from the East Fork Trail on a short-term and long-term basis. The informational signage that would be included among the proposed measures would describe the history of the Project, identify Project facilities, and provide information related to the history of the nearby Eagle Cap Wilderness. Based upon conversations in the field with people seen hiking on the trail during site visits, many people have no idea what the "pond" (the forebay) is or what other facilities are. By implementing the proposed measures, Project facilities would be less visible than they currently are and people using the trail would better understand what the Project facilities are along with the history of the Project and Eagle Cap Wilderness.

Project Facilities Located Outside of the WWNF

The Wallowa County Comprehensive Plan (Comprehensive Plan) directs land use on nonfederal lands within Wallowa County (Wallowa County, 2012). Although the Comprehensive Plan has goals related to aesthetic and visual resources (Goal 5: Open Spaces, Scenic and Historic Areas, and Natural Resources), none of the goals relate directly or indirectly to the Project.

During meetings and site visits with PacifiCorp, Forest Service, and OPRD staff, the group discussed ways to improve the existing appearance of PacifiCorp facilities when viewed from

the Wallowa Lake Trailhead, the Little Alps Day Use Area, and the end of Joseph-Wallowa Lake Highway. Several ideas that were generated by the group evolved into the following proposed measures:

- Replace the fencing at the terminus of Joseph-Wallowa Lake Highway that surrounds the Project powerhouse, substation, and fenced-in yard with black vinyl-coated chain-link fencing, which will be less visible than the existing galvanized chain-link fencing;

- Install low-maintenance landscape improvements, (native vegetation, boulders, rock, cobble, and/or gravel) at the Project powerhouse, and the edge of the Joseph-Wallowa Lake Highway terminus. The intent of the landscaping would be to screen views of the fenced-in Project powerhouse yard, and make the area more attractive. Additionally, the landscape improvements would serve as a backdrop to the interpretive sign that is proposed recreation measures described in Section 2.2.3;

- Recoat the powerhouse exterior. The light-colored powerhouse roof, which is currently visible from parts of the Chief Joseph Mountain Trail, will be recoated with a more appropriate color (i.e., darker and nonreflective). The color of the powerhouse siding will be changed to a dark green color similar to that of trees behind it to diminish the building's visibility at a time when the siding requires recoating.

Although there was no regulatory requirement to address the appearance of Project facilities on nonfederal lands, and no entity suggested that the appearance of these Project facilities be improved, PacifiCorp felt that the proposed measures would improve the appearance and image of PacifiCorp property, the entry into the WWNF and Eagle Cap Wilderness, and the terminus of the Joseph-Wallowa Lake Highway. In addition to these measures, a number of recreation-related proposed measures were developed (Section 2.2.3) that will also improve this area's order and appearance.

3.3.8 Cultural Resources

In this section, the effects of the Project alternatives on cultural resources are discussed. An overview of Federal, State, and local laws and regulations relevant to this Project is provided. The affected environment (i.e., the existing condition and baseline against which effects are measured) is then discussed. A discussion and analysis of the specific cumulative and site-specific environmental issues follows.

Federal, State, and Local Laws and Regulations

National Historic Preservation Act of 1966 (NHPA) (16 U.S.C. 470 et seq.)

Under the National Environmental Policy Act (NEPA), federal agencies must evaluate impacts to all cultural resources and those prehistoric and historical resources that are eligible for or listed in the National Register of Historic Places (NRHP) before a project is approved. The regulations that govern the implementation of the NHPA allows for combining NEPA and Section 106 studies in an effort to streamline the environmental compliance process. The Federal Energy Regulatory Commission (FERC) is the lead Federal Agency under NEPA and NHPA.

The NHPA of 1966, as amended, requires federal agencies to identify and manage historic properties that are under their jurisdiction, and encourages the preservation of historic properties through consultation and cooperation with state and local governments, Indian tribes, and private individuals. The NHPA outlines the roles that the federal government has regarding the preservation of historic properties, including considering the effects of their actions, advancing the purposes of the Act, and avoiding activities that would be contrary to its purpose. The NHPA also outlines the roles of the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), and Tribal Historic Preservation Officers (THPOs).

Section 106 of the NHPA (36 CFR 800; 16 U.S.C. 470f.) requires that any federal agency who has direct or indirect jurisdiction over a federal or federally-assisted project or any project requiring federal licensing or permitting take into account the effect of the undertaking on historic properties listed in or eligible for the NRHP. Furthermore, Section 106 provides the ACHP with a reasonable time to comment on the undertaking.

The NRHP (16 U.S.C. 470a), created under the NHPA, is the federal list of historic, archaeological, and cultural resources worthy of preservation. Resources listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history, prehistory, architecture, archaeology, engineering, and culture. The NRHP is maintained and expanded by the National Park Service on behalf of the Secretary of the Interior. The Oregon State Historic Preservation Office in Salem, Oregon administers the local NRHP program under the direction of the SHPO. To guide the determination of eligibility of properties for inclusion in the NRHP, the National Park Service has developed the NRHP Criteria for Evaluation (36 CFR Part 60.4). The criteria are standards by which every property is evaluated for listing in the NRHP. The quality of significance in American history, architecture, archaeology, and culture is possible in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association, and meet one of the following criteria:

Criterion A: Are associated with events that have made a significant contribution to the broad patterns of our history; or

Criterion B: Are associated with the lives of persons significant in our past; or

Criterion C: Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components make lack individual distinction; or

Criterion D: Has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological sites are primarily assessed under Criterion D. Buildings less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance under Criterion Consideration G, as described in the National Park Service Bulletin No. 22, "How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years."

Amendments to Section 106 of the NHPA specify that Traditional Cultural Properties (TCPs) may be determined to be eligible for inclusion on the NRHP. Specifically, a TCP is defined as a district, site, building, structure or object that is listed or eligible for inclusion in the National Register "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1998). In carrying out its responsibilities under Section 106, federal agencies are required to consult with any Indian tribe that attaches religious or cultural significance to any such properties.

Archaeological Resources Protection Act of 1979 (ARPA) (25 CFR 262.3)

ARPA prohibits the unauthorized excavation, removal, or damage of "archaeological resources on federal and Indian lands." Archaeological resources are comprehensively defined to include archaeological sites, structural remains, artifacts, and bones.

Oregon State Regulations

Implementing rules contained in the Oregon Revised Statutes (97.740–97.760; 358.905–358.955; 390.805–390.925; 271.715–271.795; 390.235; 358.605–358.622) and in the Oregon Administrative Rules (736-051-0080 through 0090; 660-023-0200) also apply to this Project. These rules require the identification of historic, archaeological, and cultural resources listed on or eligible for the national, state, or local registers. Measures must be considered to reduce or control impacts to identified historic properties affected by a proposed project. These rules also require the acquisition of archaeological permits for subsurface archaeological testing on lands owned by state or local political subdivisions.

Affected Environment

Archaeology and Ethnography

The Project Area lies within the Plateau Culture area, which extends from the Cascades to the Rockies, and from the Snake and Columbia Rivers into southern Canada (Ames et al. 1998). Most of the archaeological work in the Columbia Plateau has been conducted along the Columbia and Snake Rivers. The following section discusses the broad culture history in the Southern Plateau. The antiquity of human occupation in the Plateau extends as far back as 11,500 years before present (BP), when Clovis type fluted spear points were in use. The early inhabitants of the region were called Paleo-Indians, who were highly mobile large game hunters.

The Early Archaic period (11,000-7,000 BP) is characterized by small groups of mobile hunter-gatherers who practiced a broad spectrum subsistence economy (Aikens 1993; Ames et al. 1998).

The Middle Archaic period (7,000-5,000 BP) is defined by large side-notched, corner-notched, and laurel leaf shaped stone projectile points; bifacial knives; milling stones and pestles; bone and antler tools; and semi-subterranean pit houses (Ames et al. 1998). People lived in small, mobile groups of hunter-gatherers who had a low dependence on root and seed processing.

During the Late Archaic period (5,000-150 BP), people began to settle down in pit houses, tule mat covered long houses, and lodges, and they developed a heavy reliance on fishing, the storage of salmon, and the harvesting of camas (Ames et al. 1998). The horse was introduced around 1730 A.D., which increased mobility and transport capabilities, and subsequently strengthened existing trade networks and broadened the range of trade throughout the Plateau (Haines 1938; Schalk 1980).

The ethnographic record is likely a continuation of the lifeways and subsistence strategies that were in place by at least 3,000 BP (Fagan 1974).

The Project Area is located in the ancestral territory of the Nez Perce Tribe, who refer to themselves as *Nimi'ipuu*, which means the “real people” or “we the people” (Nez Perce Tribe Information Systems Department 2009; Ray et al. 1938). The name “Nez Perce” was given to the Nimi'ipuu by an interpreter in the Lewis and Clark expedition in 1805 (Nez Perce Tribe Information Systems Department 2009). Although the traditional homeland of the Nez Perce is north central Idaho, they traveled through Oregon, Washington, and Idaho, often within the major river drainages including the Snake, the Clearwater, and the Salmon rivers (Nez Perce Tribe Information Systems Department 2009). The Nez Perce Tribe was divided into two large bands including the Upper Clearwater and the Wallowa Valley bands, which were comprised of smaller bands that were identified by the name of the tributary stream that they lived near (Nez Perce Tribe Information Systems Department 2009). Each band had

one large village with several small villages, small village leaders, large village council and chief, and their own fishing sites (Coale 1956a; Nez Perce Tribe Information Systems Department 2009). The Nez Perce Tribe spoke the Nez Perce language (*Niimiipuutímt*), one of the two language divisions in the Sahaptian subfamily of languages in Oregon (Zucker et al. 1983).

The Wallowa band of the Nez Perce, like most other Columbia Plateau groups, depended primarily on salmon and other fish as well as root crops, including camas, bitterroot, and kous, for their subsistence (Coale 1956b). As in the protohistoric period, the Nez Perce utilized seasonal camps to collect available resources, including camps at root and berry gathering sites and fishing sites. The hunting of large and small game and the collecting of other plant resources supplemented their diet throughout the year. The Nez Perce employed various hunting techniques, including horseback and the use of decoys (Coale 1956b). Horses were also used when looking for suitable camas meadows (Coale 1956b). Horses played a major role in the Nez Perce lifeway. Ethnographic accounts mention that all men, women, and children were mounted on horses when traveling, and that individuals could own upwards of 100 horses, if not more (Coale 1956b).

Fish were the most important Nez Perce resource. Wallowa Lake served as an important communal fishing area for the Nez Perce Tribe and other Tribes, as did numerous productive fishing locations along the Wallowa River (Spinden 1908; Suphan 1974). Ray (1974) indicates the location of three such temporary village sites in the Wallowa Lake vicinity used by the Wallowa Indians and other tribal groups. Suphan (1974) also identifies two fishing sites on Wallowa Lake close to the Project Area, which are listed below:

> *53. Tamyac Pie yeppa,* a fishing site on the east shore of Wallowa Lake used by the Umatilla, Walla Walla, Cayus); and Nez Perce. The Indians camped here in August and September. After leaving this spot they went into the mountains for deer and berries (Suphan 1974: 163).
>
> *83. Ewatam-etet,* on the shores of the lower end of Wallowa Lake; here the Cayuse, Umatilla, Walla Walla, and Nez Perce fished (Suphan 1974: 166).

The Nez Perce participated in recreation activities including horse races, foot races, the stick game, and gambling, in addition to keeping dogs as pets (Coale 1956a).

History

Before Euro-American settlement commenced, the Wallowa Valley was largely the territory of Chief Joseph's Band of the Nez Perce Indians (Joseph 1965; Ruby and Brown 1981). In 1805, William Clark was the first Euro-American to meet the Nez Perce near the western end of Lolo Trail in the Bitteroot Mountains (Josephy 1965). The Washington Territory was created in 1853 by Congress.). At the time, the Nez Perce Tribe was estimated to be at 1,700

individuals, which made them the largest tribe in the Washington Territory east of the Cascade Mountains (Beckham 1998). The treaty program began in eastern Washington in the summer of 1855, creating the Nez Perce Reservation (Beckham 1998; Walker 1985). Not all Nez Perce were part of the treaty. Approximately 2,600 Nez Perce with Chief Lawyer, Spotted Eagle, James, Red Wolf, and Timothy lived on the newly formed reservation within their homelands (Myers 2001). The homelands for remaining Nez Perce with Joseph, Looking Glass, Toohoolsote, Eagle From the Light and others were outside the new reservation boundary (Myers 2001). As such, the non-treaty Nez Perce would have to leave their homelands and move onto the reservation.

The Wallowa Valley remained in the possession of the Nez Perce throughout the 1860s (Myers 2001). In 1863, Superintendent Calvin Hale secured the second treaty with the Nez Perce, which significantly reduced the size of the reservation and ceded the lands of Chief Joseph's band in Oregon; however, Chief Joseph's band was not party to the agreement (Beckham 1998). A third treaty between the United States and the Nez Perce Indians was secured in 1868 in Lapwai.

In 1860, gold was discovered on the Nez Perce Reservation on Orofino Creek, a branch of the Clearwater, which spurred a rush into the area (Ruby and Brown 1981). Gold was also discovered on the upper John Day and Powder rivers, which attracted more miners into Eastern Oregon (Beckham 1998). Communities were established in the Baker and Grande Ronde Valleys and at Canyon City on the John Day River (Beckham 1998:157). James Tulley and James Masterson were the first Euro-American settlers to descend into the Wallowa country in 1871.

Old Joseph died in 1871 and control of his band was transferred to his son, Young Joseph (*Hinmahtooyalatkekht*) (Myers 2001:110). During the early 1870s, there was much talk of war due to the growing presence of settlers, the destruction of the land, and broken promises by the U.S. government (Ruby and Brown 1981). Old Joseph advised his son to never surrender their territory (Ruby and Brown 1981:241). President Grant issued an executive order in 1873 to establish a reservation in the Wallowa Valley; however, the order was rescinded in 1875, which meant the non-treaty Nez Perce would have to move to the reservation. Meetings continued over the next two years with General Howard, Indian Agent Monteith, and the Nez Perce who signed treaties regarding the removal of the non-treaty Nez Perce to the Nez Perce reservation in Lapwai (Myers 2001:110). In 1876, Joseph agreed to a meeting in Lapwai with a commission that included General Howard, during which he almost consented to moving to the reservation (Ruby and Brown 1981). However, Toohoolsote dissuaded Joseph from making such an agreement (Ruby and Brown 1981:242). In early 1877, Indian Agent Monteith gave Joseph one month to relocate to the reservation. Joseph sent his brother Ollicut to meet with General Howard on April 19th, 1877 in Walla Walla to ask for more time to remove from the Wallowa Valley, which was refused (Ruby and Brown 1981). Ollicut suggested the dissolution of the Umatilla Reservation and the creation of a Wallowa reservation in its place (Ruby and Brown 1981). However, on May

14th, 1877, General Howard ordered the non-treaty Nez Perce to permanently relocate to the reservation by June 14th (Myers 2001:110).

The non-treaty Nez Perce did not readily accept their forced removal to the reservation and it soon became apparent to Howard that the unrest amongst the non-treaty Indians was not confined to the Nez Perce. He issued a statement in early June 1877 that various Columbia River people had to go to a reservation (Ruby and Brown 1981:243).

With the deadline fast approaching, Joseph's band began moving across the Snake River around June 1st, 1877. They rested at a Tolo Lake meadow, and were joined by other non-treaty Nez Perces (Josephy 1965; Ruby and Brown 1981). A young Nez Perce named *Wahlitits* and his cousins, Red Moccasin Tops (*Sarpsis Ilppilp*) and Swan Necklace (*Wetyetmas*) from White Bird's band, rode to Salmon River to avenge his father's death on June 13th and killed four white men (Josephy 1965; Myers 2001; Ruby and Brown 1981). The killings were not authorized by Joseph and once he had heard of them, he knew war was imminent (Ruby and Brown 1981).

The Nez Perce War of 1877 had commenced. Joseph moved his band to White Bird Canyon north of the Salmon River where gunfire was first exchanged between the Nez Perce and Captain Perry's troops (Ruby and Brown 1981). Several battles ensued around Grangeville and the Clearwater. After a defeat on the Clearwater, the non-treaty Nez Perce began traveling east on Lolo Trail with approximately 750 men, women, and children (Myers 2001). By October 1877, after several devastating battles, Joseph met with General Howard and Colonel Miles. Joseph handed his rifle to Howard, who in turn, handed it to Miles, and delivered his vow, "From where the sun now stands, I will fight no more forever" (Ruby and Brown 1981:246). Joseph and the remaining Nez Perce, who numbered approximately 418 people (87 men, 184 women, and 147 children), were moved to Fort Keogh, Montana, then to Fort Lincoln in North Dakota, then to the Quapaw Agency and finally the Ponca Agency in Indian Territory, Oklahoma in 1878 (Josephy 1965; Myers 2001; Ruby and Brown 1981). Conditions were difficult in Indian Territory and many Nez Perce suffered from melancholia and other diseases (Ruby and Brown 1981). In 1885, Joseph and the surviving 280 Nez Perce were moved to the Colville Reservation in Nespelem, Washington, and to the Nez Perce Reservation in Idaho (Beckham 1998; Josephy 1965).

Settlers arrived in the lower portion of the Wallowa Valley after the Nez Perce were forced to relocate to the reservation at first, then spread out along the Wallowa River to the upper valley and to the prairie and timber areas toward the north (Hopkins 1978: 35-36). By the early 1880s, towns began to develop on the banks of the river. The need for a principal commercial district led to the construction of several general merchandise stores in Joseph, located in the upper reaches of the Valley, and in 1883 the town was the first in the Valley to be platted. The platting of Lostine followed the next year and of Enterprise in 1886.

Opening the Wallowa County via a railroad was in progress by 1891, a result of planning during the previous 10 years. The town of Wallowa received the County's first station in

September of 1908, and exactly two months later the rail line reached Joseph (Barklow 1987:106).

The four towns that were established in the Wallowa Valley by the first decade of the 20th Century, including Enterprise, Joseph, Lostine, and Wallowa, each installed their own power plant for lighting purposes (Hopkins 1978:87). Joseph was the first community to build an electric plant in 1900. Under the direction of the Joseph Light & Power Company, the plant, which generated only enough electricity for local consumption, consisted of a 30-kilowatt inductor alternator driven by a line shaft in the Joseph Milling Company's flour mill (Dierdorff 1971:101, 103).

The previously untapped water resource at Wallowa Falls, located near the confluence of Royal Purple Creek and the East Fork of the Wallowa River, above Wallowa Lake, was realized as a likely candidate for generating power in the Valley. The Enterprise Electric Company acted on the opportunity and constructed a small log-crib dam with a mile-long penstock connecting it to a powerhouse at the foot of the mountains just south of Wallowa Lake.

When the Wallowa Falls Project was completed and put into operation, the plants at Enterprise and Wallowa were abandoned, but the Joseph unit was kept functioning as an auxiliary plant (Dierdorff 1971:103). Enterprise Electric only operated the Wallowa Falls dam until 1928 when the property was transferred to Inland Power & Light Company of Lewiston, Idaho and Clarkston, Washington. Fourteen years later, Pacific Power & Light Company (PP&L) was granted proprietorship of the Wallowa Falls Project.

The Wallowa Falls Project continued as the principal source of electricity for the Wallowa Valley, as well as receptacles outside of the immediate area, until 1947 when serious power supply shortages occurred in the PP&L system as a whole (Dierdorff 1971:189). The inconvenience to customers caused PP&L to push for a negotiation with the Bonneville Power Administration (BPA) to construct a transmission line that could meet the greater need. The agreement was made, and the completion of the BPA line in 1953 supplemented the Wallowa Valley area with the additional power supply that was required (Dierdorff 1971: 226).

PP&L continued to operate the hydroelectric facility throughout the 20th Century. Substantial modifications were made during this time to upgrade and maintain the facilities. One of the most significant alterations occurred in 1994 when the dam was rebuilt. Other major modifications to the Project included installing a new generator in 1967, modifying the windows and other elements of the powerhouse, rebuilding the Royal Purple Pipeline with an incompatible material, and repairs to the penstocks in 1995, 1999, and 2001 (PacifiCorp Archives, PacifiCorp Energy 2011).

Area of Potential Effect

The Study Area for cultural resources was conducted within the Project's Area of Potential Effect (APE). Per 36 CFR 800.16(d), the Project's APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE for cultural resources includes the proposed FERC Project boundary (see Figure 36). For this Project, a second, larger APE for indirect, including visual and auditory, effects to historic properties was also developed through consultation with the Indian Tribes. Both APEs were defined by FERC through outreach and consultation with the Oregon SHPO, USFS, appropriate Tribes, and PacifiCorp (see Figure 37). Historic properties most likely to be affected directly include archaeological sites and historical resources, and properties of religious and cultural significance, including TCPs and significant traditional use areas that may or may not be eligible for listing on the NRHP. Direct effects include physical alterations to a historic property.

Indirect effects from the Project can affect TCPs. Such indirect effects can include the diminishment of a property's aesthetics through the elimination or addition of a scenic view, changes in open space, or the introduction of a visual element that is out of character, incompatible, in contrast, or out of scale with the surrounding area. Indirect effects can also obstruct a property's view by blocking and intruding partial or entire scenic views, and by adding a visual element that detracts from a scenic view. Auditory effects can include an increase or a decrease in surrounding noise, and changes in noise levels that affect the setting of the historic property. The studies that were conducted within the APE for indirect effects identified and evaluated all historic properties and traditional use areas.

PacifiCorp proposed an amendment to the APE for direct effects which included the proposed tailrace reroute. An amendment to the APE was approved by FERC on October 29, 2013 (the amended APE is shown in blue in Figure 36 and 37) The amended APE included the alignment for the proposed tailrace, which is approximately 1,000 feet long with a 75-foot from centerline buffer on each side. The APE for indirect effects, which can include visual and auditory effects to historic properties, encompasses the proposed alignment and buffer for the tailrace reroute and did not require amendment. In January 2014, PacifiCorp expanded the Project boundary to include a small area around the campground (shown in green in Figures 36 and 37). A formal amendment to the APE is being prepared by PacifiCorp and will be provided to SHPO and consulting parties. The areas added to the Project boundary do not require additional survey as they were either included in the original pedestrian surveys or are located in steeply sloped areas that would not be feasible to survey.

Consultation

PacifiCorp initiated consultation with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Nez Perce Tribe (NPT), the Confederated Tribes of the Colville

Reservation (CTCR), the Wallowa-Whitman National Forest (WWNF), and the Oregon SHPO. The CTUIR and NPT have requested, through comments on the Proposed Study Plan, that consultation with these Tribes be conducted on a government-to-government basis with FERC. Meetings were held regularly with the agencies and Tribes to review the draft Study Plan, identify the APE, and develop scopes of work for the TCP studies. The APE for cultural resources and the Indirect/Visual APE in which the TCP studies were conducted was approved by the SHPO and other agencies and Tribes.

Figure 36. Map of the Cultural Resources APE including amendments plotted on USGS Joseph 7.5' series quadrangle.

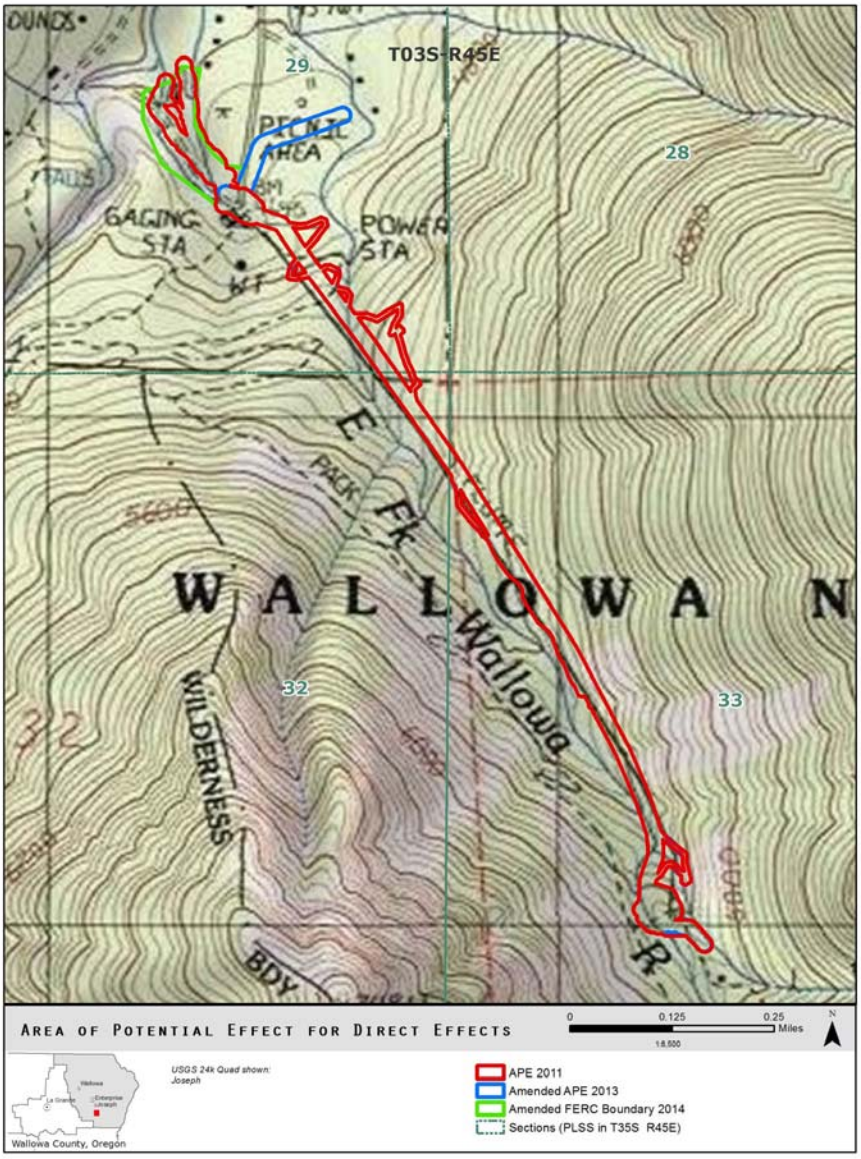
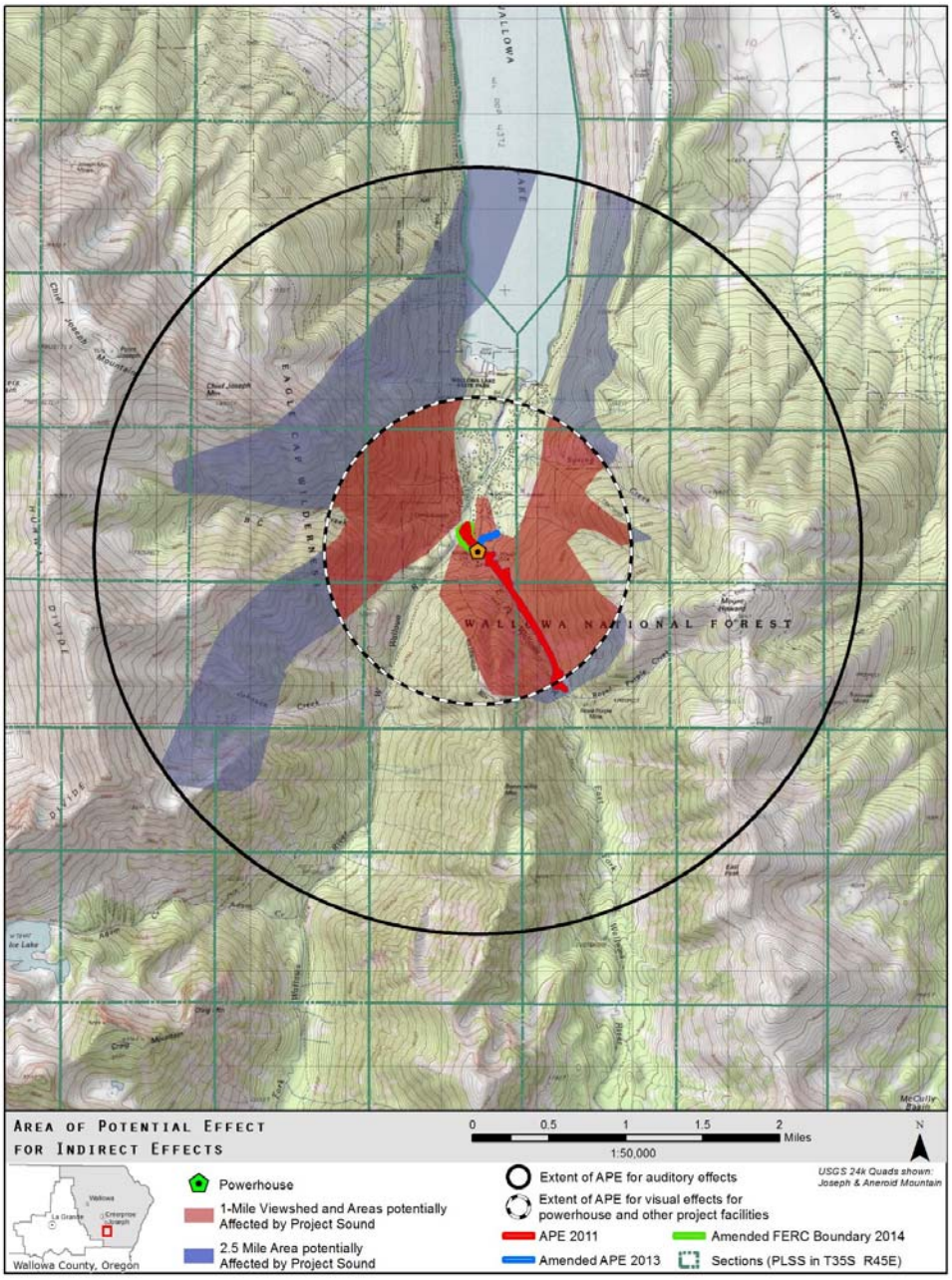


Figure 37. Map of the APE for Visual and Indirect Effects including amendments to the direct APE plotted on USGS Joseph 7.5' series quadrangle.



Archaeological Resources

Archaeological surveys have been conducted for both the original APE and the amended APE (2013). As previously discussed, the additional areas included in the FERC boundary

as amended in 2014 have either already been surveyed or do not require survey due to the steepness of the slope. On July 25, 2012 Cardno ENTRIX professional archaeologists Lucy Flynn Zuccotti and Katherine Tipton conducted an archaeological resources inventory of the APE for direct effects. The APE includes a timbered steep slope with a trail and bridges over the creek, and a less acute slope which includes graveled road and camping areas. At the time of the survey, surface visibility varied between 0–100% due to vegetation cover. Detailed methods and results of the archaeological resources survey are available in the Cultural Resources-Updated Study Report (PacifiCorp, 2013h).

On November 26, 2013 Cardno ENTRIX archaeologist Katherine Tipton conducted a pedestrian survey for archaeological resources within the amended APE of the tailrace for direct effects. At the time of the survey, surface visibility varied between 0-100% due to snow and vegetation cover.

Both pedestrian surveys were conducted in all accessible areas using 15-meter transect intervals. A non-collection policy was implemented whereby if artifacts were located, they would be recorded in the field and left in place.

No archaeological resources were located within the original APE or the amended APE by Cardno ENTRIX for the Wallowa Falls Hydroelectric Project.

Historic Resources

Cardno ENTRIX architectural historian Jennifer Flathman performed a survey of the resources within the original Project APE on July 25th, 2012. On November 26, 2013 Jennifer Flathman performed the historic resources survey of all buildings and structures within 150 feet of the amended APE. Detailed methods and results of the historic resources survey are available in Cultural Resources-Updated Study Report (PacifiCorp, 2013h).

During both surveys the structures were analyzed for NRHP eligibility. Photographs and GPS points were taken of the structures within the survey boundary. The architectural features of the resources were recorded on a historic property inventory form for inclusion in the Oregon SHPO historic property database.

Eleven historic resources have been identified within the APE for direct effects.

Table 36. Historic Resources identified within the APE

Structure	Date	Location	NRHP Eligibility Recommendation	NRHP Eligibility Determination	SHPO Concurrence
Powerhouse	1921	South end of Wallowa Lake	Not eligible	Pending	Pending
Substation and Transmission		Adjacent to the powerhouse	Not eligible	Pending	Pending

Structure	Date	Location	NRHP Eligibility Recommendation	NRHP Eligibility Determination	SHPO Concurrence
Line					
Penstock		South of the powerhouse	Not eligible	Pending	Pending
East Fork Wallowa River Dam, Spillway and Bridge	1993*		Not eligible	Pending	Pending
Forebay Intake Structure, Headgate Control Platform		South of the East Fork Wallowa River Dam	Not eligible	Pending	Pending
Dam Maintenance Shed		100 feet southeast of the East Fork Wallowa River Dam	Not eligible	Pending	Pending
Royal Purple Diversion Dam and Pipeline		400 feet southeast of the East Fork Wallowa River Dam	Not eligible	Pending	Pending
Campground Maintenance Shed	Mid 1990s	North of the powerhouse	Not eligible	Pending	Pending
Campground Restrooms	Mid 1990s	In the campground	Not eligible	Pending	Pending
Oregon State Parks Maintenance Storage Building	Mid 1960s	In the wooded area to the north of the tailrace reroute	Not eligible	Pending	Pending
Oregon State Parks Maintenance Garage	Mid 1960s	In the maintenance yard	Not eligible	Pending	Pending

* Reconstructed.

The Wallowa Falls Hydroelectric facility was originally constructed in 1921 by Enterprise Electric Company, and consists of a wood crib dam, Royal Purple Creek diversion dam and discharge pipeline, forebay, penstock, small substation, powerhouse, two maintenance sheds, tailrace, and transmission line. The buildings and structures are utilitarian with minimal architectural embellishment. Construction materials are primarily wood, steel, and native basalt. The original wood crib dam was rebuilt in 1993 and the majority of the other structures associated with the Project have been significantly modified. The individual buildings and structures have been evaluated for NRHP eligibility as a historic district as discussed below.

Statement of Significance and NRHP Eligibility

Although the Wallowa Falls Hydroelectric Project played a role in providing power to communities in Wallowa County, the majority of the structures have been significantly altered. Due to the alterations and loss of integrity of its most important elements, the facility is not eligible as a historic district for the NRHP. The two features that have not been significantly altered are the transmission line and the East Fork Wallowa Falls dam maintenance shed. Individually these features are not eligible under Criterion A for a significant contribution to the broad patterns of our history or under Criterion B: Resources due to an association with the lives of persons significant in our past. The modest structures are not eligible under Criterion C as they do not embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components make individual distinction.

The two Oregon State Parks Buildings are two of five resources located at the Oregon State Parks Maintenance Yard that are used to maintain Wallowa Lake State Park. Wallowa State Park opened in the 1950s. According to Oregon State Parks records, the structures were constructed in approximately 1964 (Honeywell 2013).

PacifiCorp and Cardno ENTRIX do not recommend these utilitarian style buildings as eligible for the NRHP. Research shows that they are not eligible under Criterion A for a significant contribution to the broad patterns of our history or under Criterion B due to an association with the lives of persons significant in our past. The field study demonstrated that these modest structures are not eligible under Criterion C as they do not embody the distinctive characteristics of a type, period, or method of construction or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components lack individual distinction. PacifiCorp plans to request concurrence from the SHPO on the NRHP eligibility of all historic structures identified within the APE.

Traditional Cultural Property and Traditional Use Area Studies

Studies to identify TCP's and significant traditional use areas were sponsored by PacifiCorp. Three tribal governments were retained to conduct appropriate investigations and to provide

confidential reports. On behalf of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Dr. Jennifer Karson Engum prepared the *Traditional Use Study of the Wallowa Falls Hydroelectric Project, Wallowa County, Oregon* (Engum 2013). On behalf of the Confederated Tribes of the Colville Reservation (CTCR) History/Archaeology Program, Ms. Arrow Coyote prepared the *Traditional Cultural Properties Study for the Wallowa Falls Hydroelectric Project* (Coyote 2013). On behalf of the Nez Perce Tribe (NPT), Nakia Williamson prepared *The Traditional Use and Ethnographic Study of the Wallowa Falls FERC Relicensing* (Williamson, 2014).

CTUIR

The CTUIR study revealed contemporary use of the Project Area and concerns about light and noise pollution emanating from the Project Area as well as direct impacts from construction (Engum 2013:22). Tribal informants expressed deep association with the Wallowa Valley and described camping, fishing, gathering and acquisition of spirit power in the vicinity of the Project Area. Engum (2013:22) documented tribal use for camping, fishing, First Foods gathering, medicine gathering, and ceremonial practices. These areas are culturally significant to the Tribes due to locations associated with traditional beliefs of the CTUIR and its cultural history. Seven traditional use areas are linked in a spatial context and also in a broad tribal narrative that includes legendary stories, native place names, ceremonial areas, acquisition of First Foods, and maintenance of burial areas (Engum 2013:23).

CTCR

The CTCR study revealed several traditional use areas within the APE associated with historical events and broad historic patterns. The CTCR study concludes that since the Wallowa Falls Dam was built in 1921 before cultural resource laws were enacted, cultural resources may have been destroyed through construction activities. The dam, spillway, catwalk, pipeline and other structures are a visual intrusion and the powerhouse generator noise is an intrusion to trail users. Coyote (2013:24) concludes that the effect on the aesthetic quality of the traditional use areas already occurred with the construction of the Wallowa Falls Dam but future improvement or maintenance projects should consider undiscovered cultural resources in the vicinity. The CTCR recommends ground disturbing activities be monitored and new or replacement structures should occupy the same footprint of older structures. New structures should be as minimally intrusive on the landscape as possible and have a low profile that blends into the natural environment as much as possible (Coyote 2013:24).

Members of the Chief Joseph Band of Nez Perce retain rights to practice their traditions under the American Indian Religious Freedom Act, as stakeholders under NEPA, and as Affected Tribes under the NHPA. The Chief Joseph Band never ceded their lands and never gave up their rights to use the lands and to practice their *wéset* religion.

NPT

The NPT study revealed the importance of Wallowa Lake and surrounding areas to the Nez Perce Tribe (or *Nimíipuu*,) for socio-cultural activities and traditional gathering practices. The Project area has been the location for hunting and fishing that were important for subsistence of the Nimíipuu (Williamson 2014: 7). The area has also been important for traditional meetings, events, and ceremonial activities. Many places within the region, including the lakes and other bodies of water, are also recognized as "being imbued with certain qualities that make them more intricately connected to the spirituality of the Nez Perce people: (Williamson 2014:8). The report stressed the importance of avoiding further alteration of the environment around Wallowa Lake, protection of traditional gathering areas, and protection of treating reserved hunting, fishing, processing sites and access to those sites. (Williamson 2014: 12).

Significance and NRHP Eligibility

The CTUIR report identifies seven significant traditional use areas of concern within the APE for indirect effects. Of these seven, one is very near the APE for direct effects. The CTCR report (Coyote 2013:22) identifies five significant traditional use areas of concern within the APE for indirect effects and none within the APE for direct effects, The NPT report identifies six significant traditional use areas of concern. Five are within the APE for indirect effects and one is outside of both APEs. Each tribe is providing either a confidential report or a confidential summary of their findings that will be filed as Volume V of the license application following the Commission's privileged and confidential filing protocol.

It is important to note that all three tribes have indicated that they do not wish to conduct formal determinations of NRHP-eligibility for the significant traditional use areas of concern they have identified in their reports.

3.3.8.1 Environmental Effects

Archaeological Resources

The Proposed Action would have no direct or indirect effects on archaeological resources. No archaeological resources that are considered historic properties were identified within the amended APE.

Historical Resources

The Proposed Action would have no direct or indirect effects on historic resources. There are no historical resources that are considered historic properties within the amended APE. PacifiCorp plans to seek formal concurrence on the determinations of NRHP eligibility and effects from the SHPO.

Traditional Cultural Properties and Traditional Use Areas

As described above, a number of significant traditional use areas of concern have been identified in the APE that have not gone through the formal NRHP eligibility process. However, based on the tribal study results, the Proposed Action would have direct and indirect effects on identified areas of significance.

According to the CTUIR, the Project Area is part of the Walwáamaxs cultural landscape. The Project could directly affect components of one significant area and will have indirect effects to seven areas of significance. The Project will adversely affect the integrity of setting, feeling and association of these areas and their associated cultural landscape that includes traditional habitation areas, fishing and hunting areas, travel corridors, food and resource gathering areas, legendary sites, battle sites, and vision quest sites of the CTUIR (Engum 2013:24). The CTUIR states that these areas are important to their traditional culture and spiritual way of life; their culture and the natural environment are intertwined and cannot be separated. No specific treatment measures were recommended.

According to the CTCR, features such as the dam, spillway, catwalk, pipeline and other structures are a visual intrusion and the powerhouse generator noise is an intrusion to trail users (PacifiCorp 2011:2-3). The effect on the aesthetic quality of the traditional use areas already occurred with the construction of the Wallowa Falls Dam. The CTCR provided general treatment measures. They recommend that any future improvement or maintenance projects should consider undiscovered cultural resources in the vicinity. Ground disturbing activities should be monitored. New or replacement structures should use the same footprint of older structures. New structures should be as minimally intrusive on the landscape as possible, with a low profile that would blend into the natural environment as much as possible (Coyote 2013:24).

According to the NPT, there are five traditional areas of significance within the Project APE for indirect effects and none specifically identified within the APE for direct effects. Although no site specific treatment recommendations were received, the study recommended general measures to avoid disturbance of areas of significance including the use of NPT monitors and ongoing coordination with the NPT (Williamson 2014: 12).

Treatment Measures

No mitigation measures are recommended for archaeological or historical resources as the Project is not anticipated to have any effect on those resources listed or eligible for the NRHP. As such there is no cost associated with any cultural resources mitigation measures.

In consideration of the significance of the general area surrounding the Project, PacifiCorp proposes the following treatment measures:

- Implement an unanticipated discovery plan for cultural resources and human remains for all Project activities within the APE for direct effects. A draft unanticipated discovery plan is attached in Appendix O;

- Conduct archaeological monitoring of any ground disturbing activities associated with construction of the proposed tailrace reroute and major capital recreation improvements. Affected tribes will be given an opportunity to participate in all monitoring activities.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Project's use of the East Fork Wallowa River for hydropower purposes to see what effect various environmental measures would have on the Project's costs and power benefits. Consistent with the Commission's approach to economic analysis, the power benefit of the project is determined by estimating the cost of obtaining the same amount of energy and capacity using the likely alternative generating resources available in the region.

The analysis includes: (1) an estimate of the net power benefit of the Project for two licensing alternatives (no-action and PacifiCorp's proposed Project); and (2) an estimate of the cost of individual measures proposed for the protection, mitigation and enhancement of environmental resources affected by the Project. To determine the net power benefit for the proposed Project, we compare Project costs to the value of the power output as represented by the cost of a likely alternative source of power in the region. A positive net annual power benefit indicates that the Project power costs less than the current cost of alternative generation resources and a negative net annual benefit indicates that Project power costs more than the current cost of alternative generation resources. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

4.1 Power and Economic Benefits of the Project

Table 37 summarizes the assumptions and economic information used in the analysis. This information was derived from PacifiCorp internal records. Cost items common to both alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal operation and maintenance costs, and Commission fees.

Table 37. Parameters for economic analysis of the Wallowa Falls Project (Source: PacifiCorp).

Parameter	Value	
Period of analysis (years)	42	
Taxes and insurance (%) (a)	NA	
Federal income tax rate	37.951%	
Levy rate	1.06%	
Assessment rate	100%	
Insurance	NA	
Net investment, $ (b)	$532,000	
Future major capital cost, $ (c)	$3,296,000	
Relicensing cost, $ (d)	$2,373,000	
Operation and maintenance, $/year (e)	$94,000	
Commission fees, $/year (f)	$199	
Energy value current Project (MWh)	Peak - 0.5 cfs Minimum Instream Release	Off-Peak - 0.5 cfs Minimum Instream Release
January	435	242
February	429	239
March	441	246
April	496	276
May	609	339
June	780	434
July	630	351
August	613	341
September	657	366
October	604	336
November	541	301
December	583	325
Capacity value ($/MW-year)	NA	
Interest rate (g)	7.57%	
Discount rate	6.61%	

a PacifiCorp is self-insured.

b Net investment is the depreciated project investment allocated to power purposes.

c Future major capital costs include major plant rehabilitation to maintain present-day capability scheduled between 2016 and 2046 and are expressed as a present value.

d Relicensing costs include the administrative, legal/study, and other expenses to date.

e Existing plant operation and maintenance includes operation and maintenance related to environmental measures associated with the current license.

f Commission fees are based on statements of annual charges received from the Commission for federal lands and administrative charges based on authorized capacity.

g Based on PacifiCorp's weighted average cost of capital.

As currently operated, the 1,100 kW Wallowa Falls Project generates an average of 6,817,000 kWh annually and has an estimated dependable capacity of 505 kW. Table 38 includes monthly values for generation under high-load period (peak) and low-load period (off-peak) conditions. These values represent PacifiCorp's marginal cost of generation as determined by system load and generation resource simulation. They reflect the cost of a mixture of generation resources available to PacifiCorp. We use monthly variable peak and off-peak energy values for our analysis in order to estimate the cost (in lost energy value) of minimum in-stream flow measures.

4.2 Comparison of Alternatives

Table 38. Summary of the annual cost, power benefits and annual net benefits for the no-action alternative and proposed Wallowa Falls Project.

	No Action	Proposed Project
Installed Capacity (kW)	1,100	1,100
Annual Generation (kWh)	6,817,000	5,317,000 (assumes a minimum in-stream release of 4 cfs)
Annual Power Value	$58.49	$58.49
($/MWh and mills/kWh		
Annual cost	$67.71	$123.46
($/MWh and mills/kWh)		
Annual net benefit/(Cost)	$(9.22)	$(64.97)
($/MWh and mills/kWh)		

4.2.1 No-action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project generates an average of 6,817 MWh of electricity annually. The levelized annual power value of the project under the no-action alternative would be $399,000 (about $58.49 per MWh). The levelized annual cost of producing this power would be $466,000 (about $68.41 per MWh), resulting in a levelized annual net cost of $67,000 (about $9.92 per MWh). In other words, the project produces energy at a cost that is slightly more than that of currently available alternative generation by $9.92 MWh.

4.2.2 PacifiCorp's Proposed Project

PacifiCorp proposes to continue operating the existing equipment in a run-of river mode. The year-round minimum in-stream flow as measured at the compliance gage will be increased from 0,5 cfs to 4 cfs. Under the proposed minimum in-stream flow of 4 cfs, the Project's installed capacity would decrease to 255 kW, a decrease of nearly 50 percent (250 kW) from the current installed capacity of 505 kW. In addition, PacifiCorp proposes to reroute the Project tailrace from its current location discharging into the West Fork Wallowa River to the East Fork Wallowa River. The total cost of the tailrace reroute is estimated at $1,500,000. The total cost of implementing all of the measures proposed under a new license is $9,112,000 including capital, O&M and lost generation. The total relicensing process cost is $2,373,000. The proposed project would have an average annual generation of 5,325,000 kWh. As proposed by PacifiCorp, the Wallowa Falls Project would have an average annual power value of $58.49 per MWh, an annual production cost (levelized over the 42-year period of analysis) of $123.46 per MWh, and an annual net cost of $64.97 per MWh. In other words, the project would produce energy at a cost that is $64.97 per MWh more than that of currently available alternative generation. PacifiCorp is requesting a license term of 50 years to allow maximum cost recovery and provide favorable customer benefits over Project decommissioning.

4.3 Cost of Environmental Measures

Table 39 gives the cost of each of the environmental enhancement measures proposed. We convert all costs to equal annual (levelized) values over a 40-year license period to give a uniform basis for comparing the benefits of a particular measure to its cost. All costs have been rounded to the nearest $1,000 with the exception of levelized annual costs.

Table 39. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Wallowa Falls Hydroelectric Project.

Enhancement/Mitigation Measure	Entities	Capital Costs	Operation and Maintenance, or annual cost item	Levelized annual cost of item
Proposed project facilities				
Tailrace Reroute to East Fork Wallowa River	PacifiCorp	$1,723,000	$1,000 annually, included in $94,000 annual O&M costs	$157,407
New in-stream flow compliance gage located on bypassed reach at forebay access road bridge	PacifiCorp	$230,000	$1,000 annually, Included in $94,000 annual O&M costs	$22,975
Replace flow monitoring equipment every 10 years	PacifiCorp	$120,000	$0	$3,530

(4x) at $30,000 per occurrence				
Proposed environmental measures				
Construction of proposed facilities				
All proposed environmental measures described in Section 2.2.3.1 are included in the total capital costs of $1,723,000 identified above for the tailrace reroute and the $230,000 identified for the in-stream flow compliance gage.				
Operation				
Provide a year-round minimum in-stream flow of 4 cfs in the East Fork Wallowa River bypassed reach	PacifiCorp	$260,000 Modify existing low level outlet to provide MIF	$87,287 Annual lost generation value	$111,778
Implement a sediment management program for forebay flushing of approx. 250 to 500 cubic yards of native sediment	PacifiCorp	$257,000 Modify existing low level outlet to operate under hydraulic head	$5,000 annually	$31,228
Conduct Geologic Hazard Assessment every 5 years (9x) at $25,000 per occurrence	PacifiCorp	$0	$225,000 total	$7,922
Geology, sediment and substrate				
BMPs for sediment and erosion control during tailrace reroute construction	PacifiCorp	$100,000 Included in the total capital costs identified above for the tailrace reroute	NA	$10,441
Implement a sediment management program for forebay flushing of approx. 250 to 500 cubic yards of native sediment	PacifiCorp	Provided in operation above	Provided in operation above	Provided in operation above
Conduct Geologic Hazard Assessment every 5 years (9x) at $25,000 per occurrence	PacifiCorp	$0	Provided in operation above	Provided in operation above
Road Management Plan	PacifiCorp	$8,000 Included in total relicensing process costs	$1,000 annually, Included in $94,000 annual O&M costs	$2,243
Water resources				
BMPs for sediment and erosion control during tailrace reroute construction	PacifiCorp	Provided in geology, sediment and substrate above	Provided in geology, sediment and substrate above	Provided in geology, sediment and substrate above
Schedule commissioning of tailrace reroute during high flows	PacifiCorp	$0	NA	NA
Provide a year-round	PacifiCorp	Provided in	Provided in	Provided in

minimum in-stream flow of 4 cfs in the East Fork Wallowa River bypassed reach		operation above	operation above	operation above
Instream flow compliance monitoring for bypassed reach	PacifiCorp	$0	$10,000 annually	$13,475
Implement a sediment management program for forebay flushing of approx. 250 to 500 cubic yards of native sediment	PacifiCorp	Provided in operation above	Provided in operation above	Provided in operation above
Implement a Turbidity Monitoring Plan for forebay flushing	PacifiCorp	$8,000 Included in total relicensing process costs	$5,000 annually	$7,633
Fish and aquatic resources				
BMPs for sediment and erosion control during tailrace reroute construction	PacifiCorp	Provided in geology, sediment and substrate above	Provided in geology, sediment and substrate above	Provided in geology, sediment and substrate above
Tailrace Reroute to East Fork Wallowa River	PacifiCorp	provided in proposed project facilities above	provided in proposed project facilities above	provided in proposed project facilities above
Schedule commissioning of tailrace reroute during high flows	PacifiCorp	$0	NA	NA
Conduct fish salvages as needed during 3 year interim operations period under a new license	PacifiCorp	NA	$10,000 each year for first 3 years under a new license	$2,041
Install fish exclusion weir in existing tailrace during bull trout spawning for 3 year interim operations period under a new license	PacifiCorp	NA	$10,000 each year for first 3 years under a new license	$2,041
Provide a year-round minimum in-stream flow of 4 cfs in the East Fork Wallowa River bypassed reach	PacifiCorp	provided in operation above	provided in operation above	provided in operation above
In-stream flow compliance monitoring for bypassed reach		provided in water resources above	provided in water resources above	provided in water resources above
Implement a sediment management program for forebay flushing of approx. 250 to 500 cubic yards of native sediment	PacifiCorp	provided in operation above	provided in operation above	provided in operation above
Comply with Oregon State Aquatic Invasive Species Prevention Program	PacifiCorp	NA	$1,000 annually for all fish, invertebrate, and botanical	$1,347

Requirements			species	
Wildlife and terrestrial resources				
Noxious weed management plan	PacifiCorp	$8,000 included in relicensing process costs	$10,000 for first two years, then $7,000 annually	$10,629
Vegetation Management plan	PacifiCorp	$5,000 included in relicensing process costs	$15,000 for first two years, then $10,000 annually	$14,657
BMPs for sediment and erosion control during tailrace reroute construction	PacifiCorp	Provided in geology, sediment and substrate above	Provided in geology, sediment and substrate above	Provided in geology, sediment and substrate above
Permit & mitigate wetland loss at tailrace reroute	PacifiCorp	$100,000 included in the total capital costs identified above for the tailrace reroute	$0	$9,523
Implement a sediment management program for forebay flushing of approx. 250 to 500 cubic yards of native sediment	PacifiCorp	Provided in operation above	Provided in operation above	Provided in operation above
Comply with Oregon State Aquatic Invasive Species Prevention Program Requirements	PacifiCorp	NA	Provided in fish and aquatic resources above	Provided in fish and aquatic resources above
Recreation resources				
Annual Coordination with Forest Service and OPRD	PacifiCorp	$0	$1,000 annually	$1,347
Campground Entry Sign	PacifiCorp	$3,000	$1,000 annually	$1,347
Install new campground host pad (300 sf), with full hook-up	PacifiCorp	$23,000	$1,000 annually	$3,122
Install new 2 room ADA accessible flush toilet unit, sewage pump facilities, site preparation, electricity, water	PacifiCorp	$140,000	$3,000 annually	$16,316
Install campsite identification signs	PacifiCorp	$2,000	$0	$195
Upgrade and restore campsite pads (one site will be ADA accessible)	PacifiCorp	$12,000	$1,000 annually	$2,172
Remove logs and stumps in campground	PacifiCorp	$4,000	$0	$372
Interpretive 3-panel sign near powerhouse	PacifiCorp	$22,000	$0	$1,952
Single panel trailhead sign with wilderness registration	PacifiCorp	$14,000	$0	$1,242

station: relocated away from powerhouse				
New trail from relocated trailhead to existing Forest Service trail system	PacifiCorp	$6,000	$1,000 annually	$1,614
Replace cable gate near powerhouse with a metal pipe-gate.	PacifiCorp	$6,000	$0s	$532
New access trail from campground west to overlook ridge and reclaim user created trails in area	PacifiCorp	$6,000	$1,000 annually	$1,614
New single panel trailhead sign at campground with wilderness registration station	PacifiCorp	$14,000	$1,000 annually	$2,324
Install six metal directional signs along forebay access road	PacifiCorp	$15,000	$0	$1,331
Improve drainage at access road-East Fork connector trail by installing a turnpike drainage structure per WWNF standards	PacifiCorp	$3,000	$0	$266
West side of forebay – single panel informational sign at East Fork Trail	PacifiCorp	$14,000	$0	$1,302
Aesthetic Resources				
Intake structure – wood shakes attached to the exterior and roof		$0	$2,000 in first license year only	$142
East Side of forebay – remove and reorganize existing PacifiCorp material storage area near storage shed	PacifiCorp	$0	$2,000 in first license year only	$142
Powerhouse – replace all fencing with black vinyl chain-link fencing. Linear footage will be reduced due to tailrace reroute	PacifiCorp	$23,000	$1,000 annually, included in $94,000 annual O&M costs	$3,184
Powerhouse – landscape approximately 2,500 sq. ft. between powerhouse and highway terminus.	PacifiCorp	$20,000	$2,000 each year for the first two years to get plants established	$2,018
Powerhouse – recoat or replace roof with dark, non-reflective color (at time of maintenance need)	PacifiCorp	$0	$18,000 one-time maintenance action in license-year 5	$1,069
Powerhouse – recoat or replace siding with dark or	PacifiCorp	$0	$40,000 one-time	$1,896

neutral color (at time of maintenance need)			maintenance action in license-year 10	
Upper penstock trestle – paint penstock and stain trestle consistent neutral color	PacifiCorp	$0	$30,000 one-time maintenance action in license-year 2	$2,040
Cultural Resources				
Implement an unanticipated discovery plan for cultural resources and human remains	PacifiCorp	$0 included in all capital project construction protocols	$1,000 annually, Included in $94,000 annual O&M costs	$1,347
Monitoring of tailrace reroute and major recreation facility construction	PacifiCorp	$57,000	NA	$5,180

5.0 ADDITIONAL CONSIDERATIONS

5.1 Unavoidable Adverse Effects

Sediment and Substrate

An unavoidable adverse effect to sediment and substrate in the East Fork Wallowa River bypassed reach will occur due to periodic maintenance flushing of the Project forebay. This maintenance flushing will result in short-term increases in suspended sediments and turbidity and sediment deposition in the East Fork caused by the temporary releases of flushed sediments from the Project Diversion dam. However, the proposed flushing of the forebay during the June high flow period (as described in Sections 2.2.2 and 3.3.2.1) would be expected to minimize the relative increase in suspended sediments and turbidity over natural baseline conditions. In addition, the concentration of turbidity and suspended sediments resulting from the forebay flushing would be limited in duration to a single event (annually) of 24 to 72 hours. The forebay will be flushed in flows calculated to effectively transport fine sediment through the bypassed reach (greater than or equal to 15 cfs). High flows during and immediately following the flushing event are expected to move sediment through the system resulting in no long term effects.

An unavoidable impact to sediment and substrate in the East Fork Wallowa River bypassed reach will occur due to construction-related activities that could result in temporary increases in suspended sediments and turbidity. These increases are likely to result from erosion or discharge of sediment material due to clearing, grading, or facilities construction for the new Project tailrace return location and the new gage (flume) installation. The area of construction-related activities, extent and duration of in-water work, and associated

disturbance would be relatively small, and the construction-related effects would be short-term and temporary in nature. In addition, the implementation of the proposed construction-related BMPs, to include an Erosion and Sediment Control Plan (as described in Section 2.2.3.1 and 3.3.1.1) would be expected to prevent or minimize the erosion or discharge of sediment material into the stream channel that might be caused from construction activities.

Both short-term construction-related effects and long-term effects to instream substrate are also expected as a result of temporary placement of cofferdams and excavation and disturbance of stream channel substrate in the localized areas of the proposed discharge pipe outfall and the stream flow compliance gage (flume). Instream substrate will be excavated and replaced with rip-rap and concrete in the localized areas of these projects.

Water Resources

Some effects of the Project on water resources are unavoidable or cannot be completely mitigated by proposed mitigation measures. An unavoidable effect to hydrology will occur due to the continued diversion of flows at the Project dam to the powerhouse. This continued diversion will result in a long-term site-specific reduction in flows in the East Fork bypassed reach between the Project dam and the new Project tailrace return location. However, the proposed modified instream flow release of 4 cfs from the Project dam to the bypassed reach is expected to minimize or eliminate any adverse impacts of these flow reductions on instream habitat availability in the bypassed reach.

An unavoidable adverse effect to water quality will occur due to periodic maintenance flushing of the Project forebay. This maintenance flushing will result in short-term increases in suspended sediments and turbidity in the East Fork caused by the temporary releases of flushed sediments from the Project Diversion dam. However, the proposed flushing of the forebay during the June high flow period (as described in Sections 2.2.2 and 3.3.2.1) would be expected to minimize the relative increase in suspended sediments and turbidity over natural baseline conditions. In addition, the concentration of turbidity and suspended sediments resulting from the forebay flushing would be limited in duration to a single event (annually) of 24 to 72 hours.

An unavoidable impact to water quality will occur due to construction-related activities that could result in temporary increases in suspended sediments and turbidity. These increases are likely to result from erosion or discharge of sediment material due to clearing, grading, or facilities construction for the new Project tailrace return location and the new gage (flume) installation. The area of construction-related activities, extent and duration of in-water work, and associated disturbance would be relatively small, and the construction-related effects would be short-term and temporary in nature. In addition, the implementation of the proposed construction-related BMPs, to include an Erosion and Sediment Control Plan (as described in Section 2.2.3.1 and Section 3.3.1.1) would be expected to prevent or minimize

the erosion or discharge of sediment material into the stream channel that might be caused from construction activities.

Aquatic Resources

Continued operation of the Project with proposed environmental measures will benefit aquatic resources relative to existing conditions. Environmental measures for aquatic resources include increased minimum instream flows, rerouting the tailrace to the East Fork Wallowa River, and scheduling forebay flushing to occur during periods of high flows. While these measures minimize Project effects, continued operation of the Project will have unavoidable adverse effects to flows, water quality, and aquatic resources.

The Project will continue to divert portions of East Fork flows to the powerhouse, resulting in alteration of the natural flow regime and reduced flows in the East Fork Wallowa River below the Project diversion dam to the tailrace reroute outfall structure, at which point the East Fork Bypassed Reach becomes a free-flowing stream with a natural hydrograph. Operation of the Project will therefore continue to affect flow conditions (e.g., flow quantity, depths, and velocities), and therefore heat transfer properties in the bypassed reach.

Rerouting the tailrace so that powerhouse flows are returned to the East Fork will result in decreased flows in the West Fork Wallowa River between the current tailrace discharge location and the East Fork confluence, a distance of approximately 0.5 miles. The extent of flow reduction will be seasonal; flows in the West Fork within this reach will decrease on the order of 10 to 33 percent during the late summer period. Lower flows at this time will increase daily water temperature within this reach of the West Fork by approximately 0.2°C on average, and by as much as 0.8°C (PacifiCorp 2013d). Reduced flows may reduce habitat quality and availability for kokanee, bull trout, and other aquatic species. Resulting increased flows in the East Fork bypassed reach will improve habitat conditions and may offset unavoidable flow reduction in the West Fork.

Another adverse and unavoidable effect of the proposed tailrace reroute is the loss of existing fish habitat within the existing tailrace channel, currently used by bull trout, brook trout, rainbow trout, kokanee, mountain whitefish, and sculpin. The tailrace reroute effectively removes approximately 985 feet (300 m) of available fish habitat (the main tailrace channel between the powerhouse and West Fork Wallowa River). This figure only includes the primary tailrace channel. There are approximately 1,320 feet (402 m) of additional braided tailrace side channels. No fish species have ever been documented in the tailrace side channels. One positive unavoidable effect of the proposed tailrace reroute however, is that the reroute effectively eliminates stranding potential in the tailrace for federally listed bull trout and other fish species, and will improve habitat in the East Fork Wallowa River bypassed reach.

The tailrace reroute will unavoidably affect two wetlands by removing their primary hydrology source. These wetlands, Tailrace and Campground Wetland, are artifacts of the Project and are relatively small (0.03 and 0.05 acres [0.12 and 0.02 ha]). Once the reroute is complete, it expected these wetlands will completely dry up and eventually become upland habitat.

Some short-term (temporary) increases in turbidity and suspended sediment are also expected in the East Fork as a result of the construction activities associated with the proposed facilities described in Section 2.2.2. Short-term construction-related effects are expected as a result of temporary placement of cofferdams and excavation and disturbance of stream channel substrate in the localized areas of the proposed tailrace discharge pipe outfall and stream flow compliance gage (flume). Long-term effects to instream substrate are also expected as a result of excavation and disturbance of stream channel substrate in the localized areas of the proposed discharge pipe outfall and the stream flow compliance gage (flume). Instream substrate will be excavated and replaced with rip-rap and concrete in the localized areas of these projects.

Periodic forebay flushing, a necessary component of Project operations, will also result in short-term but unavoidable increases in turbidity and sediment deposition. Shifting the timing of flushing to occur near the onset of seasonal high flows will minimize the magnitude and duration of effects of flushing on fish, amphibians, and benthic invertebrates.

Wildlife and Terrestrial Resources

The proposed Project would have no unavoidable adverse effects to wildlife or terrestrial resources.

Recreation Resources

Unavoidable short term adverse effects to recreation would occur during construction of the proposed tailrace reroute and when improvement measures at Pacific Park Campground would be implemented. Construction of the proposed tailrace reroute would require people using the access trails and forebay access road that start or pass near the existing Wallowa Lake trailhead sign to be rerouted. During this time recreationists would be rerouted either farther south near the Project powerhouse or farther north as needed. The rerouting would likely take less than one week and would not compromise access to the WWNF. When improvement measures at Pacific Park Campground are undertaken, the campground may be closed for periods of time, particularly when the existing vault toilets are removed and replaced with flush toilets that will be connected to an existing sewer line. Reservations will not be granted during the construction period.

Aesthetics and Visual Resources

Unavoidable short term adverse effects to aesthetics would occur during construction of the proposed tailrace reroute and when improvement measures at Pacific Park Campground would be implemented. Construction activities would involve the use of construction equipment and possibly the creation of dust. The effects would be short term.

Cultural Resources

The proposed Project would have no unavoidable adverse effects on NRHP-eligible historic properties.

5.2 Consistency with Comprehensive Plans

Section 10(a)(2) of the Federal Power Act (FPA), 16 U.S.C. section 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by a project. PacifiCorp reviewed the plans that were identified in the Pre-Application Document (PacifiCorp, 2011a), Scoping Document 1 (FERC, 2011), and the updated, 2012 FERC listing of comprehensive plans for Oregon (FERC, 2012) to determine which of the plans were relevant to the Wallowa Falls Hydroelectric Project (Project) and which were not. Most of the identified plans were developed for specific resources and/or geographic areas and are not applicable to the Project (see Table 40), located at the end of this Section). The two plans that were relevant to the Project are the Wallowa-Whitman National Forest land and resource management plan (United States Forest Service [USFS], 1990) and the Wallowa County Comprehensive Plan (Wallowa County, 2003). The Project would be consistent with the land and management directives contained in both plans.

5.2.1 Methods

The December 2012 FERC list of plans in Oregon contains 121 titles. Many plans, such as Bureau of Land Management (BLM) resource management plans developed for BLM lands, U.S. Forest Service (USFS) land and resource management plans developed for national forests (other than the Wallowa-Whitman National Forest [WWNF]), and BLM and USFS plans developed for federal wild and scenic rivers, are area-specific plans, and are not applicable to the Project. Most of the state plans contained in the 2012 FERC list of comprehensive plans were also developed for specific resources and/or geographic areas that are not applicable to the Project. Resource management entities other than federal and state agencies also developed plans that are contained in the FERC list. Many of these plans, such as those developed by the Pacific Fisheries Management Council, apply to saltwater areas and river systems containing salmon (which the Project does not contain), and were not of relevance to the Project. The 38 plans that were reviewed and are listed in Table 40 were reviewed because they appeared to potentially be of relevance to the Project. Some plans,

such as the Wallowa County Comprehensive Plan (Wallowa County, 2003), that are of relevance to the Project are not included in the FERC list, but were reviewed in this document. Table 40 identifies the plans that were reviewed and includes the following information:

- Plan Name
- Whether or not the plan was included in the FERC list
- Geographic Area Covered
- Is Plan or Document Applicable?
- Is the Project Consistent With the Plan?
- Notes

Plans that were determined to be of relevance to the Project are described in more detail in Section 2.

5.2.2 Plans applicable to Project lands and/or resources

The Project is small in area compared to most federally licensed hydroelectric projects, is located in jurisdictional areas of only two entities with comprehensive plans, and is located in a relatively remote corner of northeastern Oregon. Therefore, the majority of the comprehensive plans identified in the FERC listing of comprehensive plans in Oregon and reviewed in Table 40 that appeared to be potentially applicable to the Wallowa Falls Project are not applicable. In most cases, the geographic area that the plans pertain to does not include the Project area. In other cases, the plans may be geographically relevant to the Project but they did not contain policies or directives relevant to the Project.

Two entities are directly responsible for managing lands and/or resources in the Project area: the WWNF, and Wallowa County. Comprehensive plans developed by these two entities are used in the day-to-day management of the lands and resources of the Project. The applicable WWNF plan is described in Section 2.1 and the applicable Wallowa County plan is addressed in Section 2.2.

5.2.3 Wallowa-Whitman National Forest Land and Resource Management Plan

5.2.3.1 Background

The WWNF is managed under the Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan) that became final in 1990 (USFS, 1990). A revised plan that will include the WWNF and two other nearby national forests (the Malheur and Umatilla national forests) is currently being developed by the USFS under the Blue Mountains Forest Plan Revision. It is scheduled to be released for public review and comment sometime in 2014. No date for adoption has been set.

Chapter 4 (Forest Management Direction) of the Forest Plan summarizes current conditions of resources found within the WWNF and contains Forest-wide policies and goals and objectives related to the various resources. The resource topic of Energy Resources (Oil, Gas, Geothermal) and Power Transmission Facilities contains a goal of relevance to the Project and as well as two standards and guidelines (which are used to implement goals).

The goal of relevance to the Project reads as follows:

> *"To provide for exploration, development, and production of energy resources on the Forest in coordination with other resource values and environmental considerations: To encourage and assist, whenever possible, in the continuation of regional geologic mapping and mineral resource studies on the Forest, in cooperation with other natural resource agencies: Also, to provide for utility facilities on National Forest lands."*

The two standards and guidelines for hydropower that are of relevance to the Project read as follows:

> *"4. Hydropower: Recognize existing water power withdrawals to the extent required by law.*
> *5. Encourage hydroelectric production unless precluded or further limited by specific management area direction planning. Construction, and operation of hydroelectric projects will be consistent with the Federal Power Act and requirements of the Federal Energy Regulatory Commission."*

The Forest Plan categorizes lands within the WWNF into 18 management areas. Within each management area, specific resource management direction is provided. Some of the direction is the same as the Forest-wide direction and some is specific for that management area. The portion of the Project that is located within the WWNF is within the Roadless Recreation (Backcounty) Management Area. One of the management directives for this management area is to emphasize opportunities for dispersed recreation activities. Resource directives of direct relevance to the Project in this management area that are identified in the Forest Plan read as follows:

> *"4. Transportation: Roads and helispots may be constructed under the following conditions.*
>
> > *d. To provide needed access to approved developments such as dams or utility corridors.*
>
> *7. Construct and maintain trails and trailheads as needed to provide semiprimitive recreation opportunities.*

10. Recreation: Semiprimitive, nonmotorized, and semiprimitive motorized recreation opportunities will be provided and minor amounts of roaded natural opportunities will occur at the edges of the areas.

11. Landscape Management: The visual quality objective is foreground retention, although measures to prevent insect spread may necessitate different short-term objectives."

The WWNF issued a special-use permit to Pacific Power and Light Company (a predecessor to PacifiCorp) on February 20, 1987, authorizing the Wallowa Falls Hydroelectric Project to occupy WWNF lands. Per license Article 101, the special-use permit was filed with FERC on February 27, 1987. The 1987 special-use permit expired on December 31, 1991. A new special-use permit for the Project was issued to PacifiCorp by the WWNF (Eagle Cap Ranger District) on December 14, 1993. The 1993 special-use permit is valid until December 31, 2016.

5.2.3.2 Consistency with the WWNF Forest Plan

The Project is consistent with the overall Forest-wide Chapter 4 goals and the standards and guidelines contained in the Forest Plan related to Energy Resources that were discussed above in Section 5.2.3.1. Although the Project has been issued special-use permits by the WWNF since 1924, the presence of a hydroelectric facility might be seen to be contrary to the intent of the Forest Plan for managing a Backcountry Management Area with an emphasis on semiprimitive, non-motorized, and motorized recreation. However, because of the presence of the Project, PacifiCorp has a history of working with the WWNF to provide recreational access from the Wallowa Lake area into the WWNF and Eagle Cap Wilderness through PacifiCorp land and on a PacifiCorp facility (the Project forebay road). Public access through PacifiCorp land to the WWNF and the Eagle Cap Wilderness is provided via the East Fork Trail (which provides access to the East Fork and West Fork trails), and the Project forebay access road (which provides alternative access to the East Fork Trail). The forebay access road is entirely located within the proposed FERC Project boundary. The road is used to some degree by recreationists in the summer, but is an important winter access route for recreationists entering the WWNF because it allows them to avoid dangerous avalanche chutes that are present above parts of the East Fork Trail during periods of heavy snowpack.

PacifiCorp and the WWNF have also worked cooperatively to establish the Wallowa Lake Trailhead on PacifiCorp land. The trailhead is the official starting point for accessing the WWNF and Eagle Cap Wilderness from the Wallowa Lake area. Because of these factors, it can be stated that the Project supports the Forest Plan objective of providing opportunities for dispersed recreation in areas classified as Backcountry Management Area by providing and supporting public access to the WWNF and Eagle Cap Wilderness from the Wallowa Lake area.

The Forest Plan also states that lands within the Backcountry Management Area are to remain relatively natural and undeveloped. Although the Project introduces a developed facility into a part of the WWNF, whereas the Forest Plan emphasizes a natural and undeveloped landscape, the areas from which Project facilities can be viewed by the recreating public are limited. The Project is visible from one section of the East Fork Trail that is perhaps several hundred feet in length. The mitigation measures proposed in this license application will help reduce the visibility of the Project from the trail.

5.2.4 Wallowa County Comprehensive Plan and Zoning Ordinance Articles

5.2.4.1 Background

The Project is located entirely within Wallowa County, which has land use planning enforcement jurisdiction of all non-federal land within the county. The Wallowa County Comprehensive Plan and its associated ordinances direct land use in the county (Wallowa County, 2003). The Project is located within an area of the county that is unincorporated. The southern portion of Wallowa Lake (including the Project) has been assigned a land use plan designation of Unincorporated Resort Community. Within this land use plan designation are several zones, three of which have been assigned to lands that the FERC Project boundary is located on. The three land use plan designation zones are:

- Resort Commercial Recreation
- Resort Park
- Timber Commercial

The powerhouse and a portion of the lower penstock are located in an area that is assigned a land use plan designation zone of Resort Commercial Recreation. This designation was devised to provide minimum standards for commercial development and uses in areas of the county that are used primarily by visitors from outside the county. Several types of uses that are necessary for public services, including power generation facilities, are allowed as conditional uses.

A section of the lower penstock is located on land assigned a land use plan designation zone of Resort Park. Under this zone only those uses that are consistent with passive private and commercial recreational uses and that do not involve the construction of buildings are permitted. As is the case in the Resort Commercial Recreation zone, utility or communication facilities necessary for public services, including power generation facilities and transmission, are allowed as conditional uses.

The portions of the Project that are on national forest system land include the upper penstock, much of the forebay access road, the dam, and the forebay. The lands where these Project components are located have been designated as Timber Commercial by Wallowa County.

However, the management of these lands is the responsibility of the WWNF under the guidance of the Forest Plan.

5.2.4.2 Consistency with the Wallowa County Comprehensive Plan and Zoning Ordinance Articles

The entire FERC Project boundary is located within Wallowa County. Power generation facilities and power transmission are allowed as conditional uses in all three of the county land use designations. The Project is consistent with the Wallowa County Comprehensive Plan.

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Relevant Plans							
U.S. Forest Service. 1990. Wallowa-Whitman National Forest Land and Resource Management Plan. Department of Agriculture, Baker City, Oregon. April, 1990.	Yes	Northeast (NE) Oregon (OR) and part of Project	Yes	Yes	Yes	Yes	See Section 2.0
Wallowa County. Wallowa County Comprehensive Plan. May, 2003.	No	Wallowa County, OR	Yes	Yes	Yes	Yes	See Section 2.0
Plans Reviewed that Were Not Relevant							
U.S. Forest Service. 1995. Eagle Cap Wilderness Stewardship Plan. Department of Agriculture. Enterprise, Oregon. January, 1995.	No	South of FERC Project boundary in the Wallowa-Whitman National Forest (WWNF)	No	No	No	Not applicable (NA)	Because the Project is not located within the Eagle Cap Wilderness the management directives of the plan do not pertain to the Project. The Project does support some of the goals of the plan by providing public access through PacifiCorp lands into the WWNF and the Eagle Cap Wilderness.
Bureau of Land Management. 1993. Wallowa and Grande Ronde Rivers Final Management Plan. Department of the Interior, Baker City, Oregon. December, 1993.	Yes	NE OR, southeast (SE) Washington (WA).	No – see notes	No	No	NA	The plan applies to the lower portion of the Wallowa River that is between Minam and the river's confluence with the Grande Ronde River. Minam is over 30 miles from the Project boundary.
Bureau of Land Management and U.S. Forest Service. 1996. Status of the Interior Columbia Basin: Summary of Scientific Findings.	Yes	Columbia Basin – OR, Idaho (ID), WA	Yes	No	No	NA	The document is a summary of the scientific findings of the Interior Columbia Basin Ecosystem Management Project that examined

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Portland, Oregon. November, 1996.							145 million acres within the Pacific Northwest region. Part of the reason for the project was to provide a foundation for basin managers and the public to use to discuss future resource management. The document is not directly relevant.
Department of the Army, Corps of Engineers (ACOE). Portland District. 1993. Water Resources Development in Oregon. Portland, Oregon. 1993.	Yes	Portland District of the ACOE.	Yes	No	No	NA	This document provides an overview of the role of the Portland District of the ACOE in water resource development and water resource programs. It is informational and is not a management or policy plan.
Governor's Hydroelectric Planning Group. 1985. Preliminary Site Resource Inventory: Report to the 63rd Legislative Assembly. Salem, Oregon. March, 1985.	Yes						File on Federal Energy Regulatory Commission (FERC) website damaged and can't be downloaded.
Hydro Task Force and Strategic Water Management Group. 1988. Oregon Comprehensive Waterway Management Plan. Salem, Oregon.	Yes	OR	Yes	Yes	No	NA	Identifies the roles and responsibilities of state agencies related to water resources and decision-making processes for the beds and banks of navigable rivers in Oregon. Plan applies to the wild and scenic portion of the Wallowa River, not the portion of the river that flows through the Project.
National Park Service (NPS). 1982. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. January, 1982.	Yes	No	No	No	No	NA	Lists rivers in the national wild and scenic river system and rivers being studied for inclusion. The 10-mile portion of the Wallowa River between

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Updated NPS Nationwide Rivers Inventory website accessed May 1, 2013. http://www.rivers.gov/rivers/rivers/wallowa.php							Minam and the river's confluence with the Grande Ronde River has been classified as a Recreation River and is part of the national wild and scenic river system.
Northwest Power and Conservation Council. 2000. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2000-09.	Yes	Columbia River Basin	Yes	No	No	NA	Policy document to establish basin- wide vision for fish and wildlife, along with objectives and action strategies. The document states that the program will be implemented through subbasin plans that will be developed.
Northwest Power and Conservation Council. 2009. Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2009-09. October, 2009.	Yes	Columbia River Basin	Yes	No	No	NA	The program establishes a basinwide program for fish and wildlife for the recovery, rebuilding, and mitigation of hydroelectric development
Northwest Power and Conservation Council. 2010. The Sixth Northwest Conservation and Electric Power Plan. Portland, Oregon. Council Document 2010-09. February, 2010.	Yes	Pacific Northwest	Yes	No	No	NA	This is a broad-based regional policy plan that does not have direct relevance to the Project. It addresses risks of uncertainties related to climate change policy, future fuel prices, salmon recovery, economic growth, and the most cost-effective and least risky resource for the region; an improved efficiency of electricity use
Northwest Power and Conservation Council. 1988. Protected Areas Amendments and Response to Comments. Portland, Oregon.	Yes	OR, WA, , ID, western Montana (MT)	Yes	No	No	NA	In 1988, the Northwest Power Planning Council (NWPPC) adopted a proposal to designate streams as protected areas because of their importance as critical

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Council Document 88-22 (September 14, 1988).							fish and wildlife habitat. Did not apply to hydropower projects that existed in 1988.
Northwest Power and Conservation Council. 2003. Mainstem Amendments to the Columbia River Basin Fish and Wildlife Program. Portland, Oregon. Council Document 2003-11.	Yes	Mainstems of Columbia & and Snake rivers in WA, OR, ID, MT	Yes	No	No	NA	NWPCC developed plan to protect, mitigate, and enhance fish and wildlife affected by hydroelectric facilities on the mainstems of the Columbia and Snake rivers. Only applicable to mainstems of the Columbia and Snake rivers.
Oregon Department of Energy. 1987. Oregon Final Summary Report for the Pacific Northwest Rivers Study. Salem, Oregon. November, 1987.	Yes	OR	No (did not include area containing Wallowa River).	No	No	NA	This document is the final summary report of the Pacific Northwest Rivers Study in Oregon. The study identified resource values that might affect hydropower development. It examined rivers and streams in seven regions in the state: the North Coast, Willamette, Mid-Columbia, Snake River and Klamath Basins, and South Coast Regions. None of these regions include the Wallowa River or Grande Ronde River.
Oregon Department of Environmental Quality. 1978. Statewide Water Quality Management Plan. Salem, Oregon. November 1978. Seven volumes.	Yes	OR	Yes	No	No	NA	This broad-based, statewide plan contains a detailed assessment of programs developed to identify point and non-point source pollution programs, and identifies control programs.
Oregon Department of Fish and Wildlife (ODFW). 1982.	Yes	OR	Yes	Yes	No	NA	A comprehensive plan to manage Oregon's anadromous salmon and trout

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Comprehensive Plan for Production and Management of Oregon's Anadromous Salmon and Trout: Part I. General Considerations. Portland, Oregon. June 1, 1982.							resources. Applies four concepts to wild fish, stocks, stock recruitment relationships, and habitat requirements for prudent management of anadromous fish resources
ODFW. 1987. Statewide Trout Management Plan. Portland, Oregon. November, 1987.	Yes	OR	Yes	Yes	Plan is no longer current	NA	The plan provided goals, objectives, strategies and guidelines for the statewide management of trout. Provided direction for basin, subbasin, and mini plans for individual rivers and water bodies. The 1987 plan was intended to direct future trout management and was to be reviewed in 6 years.
ODFW. 1987. Trout Mini-management Plans. Portland, Oregon. December 1987.	Yes	Parts of OR	No	No	No	NA	The mini-plan was developed for several rivers, none of which is the Wallowa River. The document lists trout mini-management plans that were developed between 1978 and 1986. Among the mini-plans was one developed for Wallowa Lake; however, it could not be located in the FERC e-Library.
ODFW. 2003. Oregon's Elk Management Plan. Portland, Oregon. February, 2003.	Yes	State of Oregon	Yes	Yes	Generally, but no specific mention of, or directives related to, populations in the Project area	NA	A plan to guide elk management and to identify ODFW elk management policies and strategies for the public, other agencies, and private landowners. Plan covers a 10-year period.
ODFW. 1993. Oregon Black Bear Management Plan, 1993-1998.	Yes	State of Oregon	Yes	Yes	Generally, but no specific mention of,	NA	Plan intended to review success of previous plan developed 5 years prior to

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Portland, Oregon.					or directives related to, populations in the Project area.		this plan, and revise and update new identified concerns.
ODFW. 1993. Oregon Wildlife Diversity Plan. Portland, Oregon. November, 1993.	Yes	OR	Yes	Yes	Generally, but no specific mention of, or directives related to, populations in the Project area.	NA	A 5-year plan that replaces the previous 1988 plan. Provides direction to ODFW for the management of the state's species and their habitats. Informs the public of proposed actions by ODFW.
ODFW. 2006. Oregon Cougar Management Plan. Roseburg, Oregon. May, 2006.	Yes		Yes		Generally, but no specific mention of, or directives related to, populations in the Project area		The plan updated the 1993-1998 Oregon Cougar Management Plan. Plan updated cougar management in the state.
ODFW. 2001. Oregon Wildlife and Commercial Fishing Codes: 2001-2002. Portland, Oregon.	Yes	OR	No	No	No	NA	Publication that lists statewide regulations, etc.
ODFW. 1995. Biennial Report on the Status of Wild Fish in Oregon. Portland, Oregon. December, 1995.	Yes	OR	Yes	No	No	NA	The report provides a species overview of freshwater and estuarine wild fish species in Oregon – it is not a management plan.
ODFW. 1996. Species at Risk: Sensitive, Threatened, and Endangered Vertebrates of Oregon. Portland, Oregon. June, 1996 (3 parts). Plan for Redband/Inland Rainbow Trout and Northern Pygmy Owl	Yes	OR	Yes	No	No	NA	This document was developed as an information source to provide updated information relative to sensitive, threatened, and endangered vertebrates. It is not a management plan and its information is not current.
ODFW. 2006. Oregon	Yes	Yes	Yes	No	No	NA	This Conservation Strategy report

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
Conservation Strategy. Salem, Oregon. February, 2006.							provides an adaptive and comprehensive framework that builds on previous plans and provides a menu of recommended voluntary actions and tools to help inspire local communities, landowners, and citizens to define their own conservation role. It is not a regulatory document but instead presents issues, opportunities, and recommended voluntary actions that will improve the efficiency and effectiveness of conservation in Oregon.
ODFW. 2009. 25-year Recreational Angling Enhancement Plan. Salem, Oregon. February, 2009.	Yes	OR	Yes	No	No	NA	Identifies statewide strategies for enhancing, developing, and promoting diverse and productive recreational fishing. Not location-specific.
Oregon Department of State Lands. 2003. Oregon Natural Heritage Plan. Salem, Oregon.	Yes	OR	Yes	No	No	NA	Plan of the Oregon Natural Heritage Program that identifies high-quality and representative examples of native Oregon habitats and species, and works to protect these natural treasures through voluntary and cooperative habitat conservation agreements.
Oregon Department of Transportation. 1985. Grande Ronde and Wallowa River Scenic Waterway Study. Salem, Oregon. June, 1985.	Yes	Grande Ronde and Wallowa rivers, NE OR	Yes	No	No	NA	Study of natural and cultural features covering the lower 42 miles of the Grande Ronde River and the lower 10 miles of the Wallowa River (from Minam to the confluence with the Grande Ronde River) for designation as Oregon Scenic Waterways. Minam is

Table 40. Wallowa Falls Hydroelectric Project – Comprehensive Plans Reviewed

Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
							over 30 miles from the Project.
Oregon State Game Commission. 1963-1975. Fish and Wildlife Resources - 18 Basins. Portland, Oregon. 21 reports.	Yes	OR	Yes	No	No	NA	Out of date.
Oregon Parks and Recreation Department (OPRD). Oregon Outdoor Recreation Plan (SCORP): 2003-2007. Salem, Oregon. January, 2003.	Yes	OR	Yes	Yes	Yes	NA	Typically provides data related to recreation patterns, geographic differences, and trends that are useful recreation studies related to FERC relicensing projects, rather than providing directives that need to be followed. Was used in the Wallowa Falls Hydroelectric Project FERC No. P-308 Recreation Study Plan Progress Report to examine recreation trends.
OPRD. 2008. 2008-2012 Oregon Statewide Comprehensive Outdoor Recreation Plan: Outdoor Recreation in Oregon: The Changing Face of the Future. February, 2008.	No	OR	Yes	Yes	Yes	NA	This document focused on ways of getting the public more involved in outdoor recreation.
OPRD. Oregon Shore Management Plan. Salem, Oregon. January, 2005.	Yes	OR	No	No	No	NA	Developed for shoreline areas as a broad-based plan.
OPRD. 1987. Recreational Values on Oregon Rivers. Salem, Oregon. April, 1987.	Yes	OR	Yes	Yes	No	NA	The study is not a management plan. It was identified as a first step in inventorying and assessing the value of river recreation in Oregon so as to minimize potential conflicts with

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							hydropower development. The Wallowa River was given an overall rating of 1 (outstanding) for recreation.
OPRD. Undated. The Oregon Scenic Waterways Program: A Landowner's Guide. Salem, Oregon.	Yes	Yes	Yes	No	No	NA	The handbook was intended to be informational only and was directed to landowners who are adjacent to rivers that have been designated as part of the Oregon Scenic Waterways Program. The portion of the Wallowa River that is a state scenic waterway is 30 miles from the Project.
Oregon Water Resources Board. 1973. Surface Area of Lakes and Reservoirs. Salem, Oregon.	Yes	Yes	Yes	No	No	NA	This document tabulated all lakes and reservoirs in Oregon over one acre in size. It is not a management plan.
Oregon Water Resources Commission. 1987. State of Oregon water use programs. Salem, Oregon.	Yes	OR	Yes	No	No	NA	This document provided an overview or state water use programs and was not intended to be a management plan.
Oregon Water Resources Department. 1988. Oregon Water Laws. Salem, Oregon.	Yes	OR	Yes	No	No	NA	This document contains water-related statutes. It is not a management plan.

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Plan Name	FERC List	Geographic Area Covered	Geographic Area Applicable? (If No, see notes)	Plan or Document Applicable?	Relevant to Project	Project Consistency	Notes
State of Idaho. State of Oregon. State of Washington. Confederated Tribes of the Warm Springs Reservation of Oregon. Confederated Tribes of the Umatilla Indian Reservation. Nez Perce Tribe. Confederated Tribes and Bands of the Yakima Indian Nation. 1987. Settlement Agreement pursuant to the September 1, 1983, Order of the U.S. District Court for the District of Oregon in Case No. 68-5113. Columbia River Fish Management Plan. Portland, Oregon. November, 1987.	Yes	OR, WA, ID	Yes	No	No	NA	The settlement agreement is not a management plan.
North American Waterfowl Management Plan. Department of the Interior and Environment Canada. May 1986.	Yes	North America	Yes	No	No	NA	North America-wide, policy-oriented management plan for waterfowl.
U.S. Fish and Wildlife Service. Undated. Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C. U.S. Fish and Wildlife Service and the Canadian Wildlife Service. 1986.	Yes	USA	Yes	No	No	NA	Nationwide policy document related to recreational fishing.

6.0 LITERATURE CITED

Ahlenslager, K. and L. Potash. 2007. Conservation Assessment for 13 Species of Moonworts (*Botrychium* Swartz Subgenus *Botrychium*). USDA Forest Service Region 6 Portland, Oregon and USDI Bureau of Land Management Oregon/Washington. (April 18, 2007).

Aikens, M.C. 1993. Archaeology of Oregon. U.S. Department of the Interior Bureau of Land Management, Portland.

Ames, K., D.E. Dumond, J.R. Galm, and R. Minor. 1998. Prehistory of the Southern Plateau. In *Handbook of North American Indians, Volume 12, Plateau*, pp. 103-119. Wayne Suttles, ed. Smithsonian Institution Press, Washington, D.C.

Barklow, I. 1987. *From Trails to Rails: The Post Offices, Stage Stops, & Wagon Roads of Union County, Oregon*. Maverick Publication, Bend.

Beckham, S.D. 1989. History Since 1846. In *Plateau*, edited by Deward E. Walker, pp. 149-173. Handbook of North American Indians, Vol. 12, Willliam C. Sturtevant, general editor, Smithsonian Institution, Washington D.C.

Beckham, Stephen Dow. 1998. History Since 1846. In Plateau, edited by Deward E. Walker, Jr., pp. 149-173. Handbook of North American Indians, Vol. 12, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

BioResources. 2012. Wallowa Falls Hydroelectric Project Special Status Plant Study and Noxious Weed Study.

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.

Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's Bull trout. Oregon Department of Fish and Wildlife, Portland, OR.

Budlong, Bryce, J.R. Collier, Calvin Davis, David E. Gilbert, Rob Ledgerwood, and Jay Van Tassell. September 2005. Eastern Oregon Geology Vol. 2, The Bathymetry and Sediments of Wallowa Lake, Northeast Oregon. Science Department- Badgley Hall, Eastern Oregon University, La Grande, OR 97850-2899. http://www.eou.edu/geology/wallowalake.html.

Clemmens, A., T. Wahl, M. Bos, and J. Replogle. 2001. Water Measurement with Flumes and Weirs. ILRI Publication 58, International Institute for Land Reclamation and Improvement, Wageningen, The Netherlands, 382 p.

Coale, G. 1956a. Ethnohistorical Sources for the Nez Percé Indians: Part 1. *Ethnohistory* 3(3):246-255.

Coale, G. 1956b. Ethnohistorical Sources for the Nez Percé Indians: Part 2, Concluded. *Ethnohistory* 3(4):346-460.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. Laroe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Dep. Int., Fish and Wildl. Serv., Publ. No. FWS/OBS-79/31. Washington, D.C. 181 pp.

Coyote, A. 2013. *Traditional Cultural Properties Study for the Wallowa Falls Hydroelectric Project.* Prepared by the Confederated Tribes of the Colville Reservation History/Archaeology Program, Nespelem, Washington.

Cramer, S.P. and K.L. Witty. 1998. Feasibility for reintroducing sockeye and coho salmon in the Grande Ronde basin. Report to Bonneville Power Administration. Project No. 1998-05301.

Crowe, E.A. and R.R Clausnitzer. 1997. Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests. Tech. Pap. R6-NR-

Dierdorff, J. 1971. *How Edison's Lamp Helped to Light the West: The Story of Pacific Power & Light Company and its Pioneer Forebears*. Pacific Power & Light Company, Portland.

DeVore, P. W., L. T. Brooke, and W. A. Swenson. 1980. The Effects of Red Clay Turbidity and Sedimentation on Aquatic Life In the Nemadji River System. Impact of Nonpoint Pollution Control on Western Lake Superior. S. C. Andrews, R. G. Christensen, and C. D. Wilson. Washington, D.C., U.S. Environmental Protection Agency. EPA Report 905/9-79-002-B.Dierdorff, J. 1971. *How Edison's Lamp Helped to Light the West: The Story of Pacific Power & Light Company and its Pioneer Forebears*. Pacific Power & Light Company, Portland.

Dube', Kathy. Watershed GeoDynamics. Memo to Briana Weatherly. "East Fork Wallowa River – flow required to mobilize sand during flushing." 13 Feb. 2014.

Dunham, J. B., and B. E. Rieman. 1999. Metapopulation Structure of Bull Trout: Influences of Physical, Biotic, and Geometrical Landscape Characteristics. Ecological Applications 9:642–655

ECOL-TP-22-97. Baker City, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest. 299 p.

Engum, J.K. 2013. *Traditional Use Study of the Wallowa Falls Hydroelectric Project, Wallowa County, Oregon*. Confederated Tribes of the Umatilla Indian Reservation, Pendleton, Oregon.

Evaluation Framework Interim Final. Prepared by U.S. Army Corps of Engineers – Seattle District, Portland District, Walla Walla District, and Northwestern Division; Environmental Protection Agency Region 10; Washington Department of Ecology; Washington Department of Natural Resources; Oregon Department of Environmental Quality; Idaho Department of Environmental Quality; National Marine Fisheries Service; and the U.S. Fish and Wildlife Service.

Fagan, J. 1974. *Altithermal Occupation of Spring Sites in the Northern Great Basin.* University of Oregon Anthropological Papers 6. University of Oregon, Eugene.

Federal Register, Vol. 75, No. 200 – October 2010 pgs. 63,898-64,070.

Federal Energy Regulatory Commission (FERC). 2011b. *Scoping Document 1 for Wallowa Falls Hydroelectric Project, P-308*. April, 2011.

FERC. 2012. *List of Comprehensive Plans*. December, 2012.

Fraley, J. J., and B. B. Shepard. 1989. Life history, ecology and population status of migratory bull trout *(Salvelinus confluentus)* in the Flathead Lake and river system, Montana. Northwest Science 63: 133-143.

Federal Register for July 19, 2011 (76 FR 42631-42654). Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Pinus albicaulis as Endangered or Threatened with Critical Habitat.

Friemuth P, D. Bass. 1994. Physicochemical Conditions and Larval Chironomidae (Diptera) of an Urban Pond. Proc Oklahoma Academy Science; 74:11-16.

Fulton, T.W. 1902. The rate of growth of fishes. 20th Annual Report of the Fishery Board of Scotland 1902 (3):326-446.

Gallepp, G. W. 1977. Responses of caddisfly larvae Brachycentrus spp. to temperature, food availability, and current velocity. AMN 98: 59-84.

Gregory, R. S., and C. D. Levings. 1998. Turbidity Reduces Predation on Migrating Juvenile Pacific Salmon. Transactions of the American Fisheries Society 127: 275-285.

Goodson, K., B. McIntosh, M. Chilcote, and C. Corrarino. 2005. Oregon Native Fish Status Report. Oregon Department of Fish and Wildlife, Fish Division, Salem, OR.

Haines, F. 1938. The Northward Spread of Horses Among the Plains Indians. *American Anthropologist*, 40:429-437.

Honeywell, Todd. 2013. "Construction date for structures in Wallowa Lake Maintenance yard." Email correspondence between Todd Honeywell, Park Manager, Wallowa Lake Management Unit and Jennifer L. Flathman.

Kinunen, W. and J.R. Moring. 1976. Status and Origin of Rainbow Trout Broodstocks in Oregon. Oregon Department of Fish and Wildlife, Research Section, Corvallis, Oregon.

Hopkins, L. 1978. *This Valley (Wallowa Valley). Quality Paperback, Boring, Oregon.*

Isaak, D. and W. Hubert. 2001. A Hypothesis About Factors That Affect Maximum Summer Stream Temperatures Across Montane Landscapes. Journal of the American Water Resources Association 37 (2), 351-366.

Johnson, C.G., Jr. and S.A.Simon. 1987. Plant Associations of the Wallowa-Snake Province. Tech. Publ. R6-ECOL-TP-225b-86. Baker City, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest. 272 p.

Josephy, Jr., A.M. 1965. The Nez Perce Indians and the Opening of the Northwest. Yale University Press, New Haven.

Lloyd, D. S. 1987. Turbidity as a Water Quality Standard for Salmonid Habitats in Alaska. North American Journal of Fisheries Management 7: 34-45.

Lloyd, D. S., J. P. Koenings, and J. D. LaPerriere. 1987. Effects of Turbidity in Fresh Waters of Alaska. North American Journal of Fisheries Management 7: 18-33.

Marshall, D.B, M.G. Hunter, and A. L. Conterras. 2003, Birds of Oregon. Oregon State University Press, Corvallis, OR.

McLeay, D. J., I. K. Birtwell, G. F. Hartman, and G. L. Ennis. 1987. Responses of Arctic Grayling (Thymallus arcticus) To Acute and Prolonged Exposure to Yukon Placer Mining Sediment. Canadian Journal of Fisheries and Aquatic Sciences 44: 658-673.

McPhail, J.D., J.S. Baxter. 1996. A Review of Bull Trout (*Salvelinus confluentus*) Life-history and Habitat Use in Relation to Compensation and Improvement Opportunities. Department of Zoology, UBC. Fisheries Management Report No. 104.

MEMO: Robert Wisseman, Aquatic Biology Associates, Inc., Corvallis, OR to Jeremiah Doyle, PacifiCorp Energy. February 25, 2013

Myers, L.D. 2001. An Archival Review and Ethnographic Study for the Relicensing of the Hells Canyon Complex Hydroelectrical Plants (FERC No. 1971), Hells Canyon, Idaho-

Oregon. Technical Report Appendix E.4-12. Report submitted to Idaho Power Company, Boise. Epochs Past, Tracys Landing, Maryland.

National Park Service (NPS) 2011. Comment letter sent by National Park Service to FERC responding to the pre-application document, scoping document, and study request letter. June 20, 2011.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. URL: http://www.natureserve.org/ explorer. (April 29, 2013).

Newcombe, C. P., and D. D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management 11: 72-82.

Newcombe, C. P., and J.O. Jensen. 1996. Channel suspended sediments and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16(4): 693-727.

Nez Perce Tribe Information Systems Department. 2009. Revised 2010. Nez Perce History. Available online, http://www.nezperce.org/Official/history.htm.

Nielsen, L.A., and D. L. Johnson, editors. 1983. Fisheries Techniques. American Fisheries Society, Bethesda, MA.

NMFS. 2000. National Marine Fisheries Service Backpack Electrofishing Guidelines

NMFS (National Marine Fisheries Service). 2011. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon.

NOAA. 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon, 73 FR 60987, 60991 (October 15, 2008).
ODEQ. 1998. Guidance for Ecological Risk Assessment: Levels I, II, III, IV.

ODEQ. 2001. Guidance for Ecological Risk Assessment: Levels I, II, III, IV. Oregon Department of Environmental Quality Final 1998, Screening Levels updated 12/2001.

ODEQ. 2005. Portland Harbor Joint Source Control Strategy.

ODEQ 2005. Portland Harbor Joint Source Control Strategy.

ODEQ. 2007. Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment.

ODEQ. Construction Stormwater Erosion and Sediment Control Manual. January 2013.

ODFW. 2012. Fish Propagation Annual Report for 2011.Oregon Department of Fish and Wildlife, Fish Division, Salem, OR.

Olson, D. 2011. Conservation assessment for the Rock Mountain Tailed Frog in Oregon and Washington. USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR. 33 pp.

Oregon Biodiversity Information Center. 2010a. Rare, Threatened and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, Oregon. 105pp.

Oregon Biodiversity Information Center. 2012. May 25, 2012. Oregon Biodiversity Information Center data system for rare, threatened and endangered plant and animal records within two-miles of the Wallowa Falls Dam Project in T 03S R 45E Sections 28, 29, 32, and 33,WM. Unpublished report for Bi-Resources, Inc.

Oregon Department of Agriculture. 2011. Weedmapper data for Wallowa County. URL: http://www.weedmapper.org/wallowa_maps.html. (June 12, 2011).

Oregon Flora Project. 2006. Mirabilis macfarlanei fact sheet. URL: http://www.oregonflora.org/pdf/rarepdfs/mirmac.pdf. (April 29, 2013).

Oregon Department of Fish and Wildlife (ODFW). 2013. Imnaha Wolf Pack Timeline of Events. URL: http://www.dfw.state.or.us/wolves/imnaha_wolf_pack.asp. (July 11, 2013).

Oregon Department of Fish and Wildlife (ODFW). 2014. Aquatic Invasive Species Prevention. URL: http://www.dfw.state.or.us/conservationstrategy /invasive_species/quagga_zebra_mussel.asp. (January 9, 2014)

Oregon Department of Land Conservation and Development, 2013. "Coastal Zone Management Act Applicability." Email correspondence between Russ Howison, Wallowa Falls Project Manager, and Juna Hickner, Coastal State-Federal Relations Coordinator

Oregon Live. 2012. "Oregon's 10 Most Popular State Parks." http://www.oregonlive.com/outdoors/camping/index.ssf?/outdoors/top10parks.frame Accessed October 3, 2012.

Oregon Parks and Recreation Department (OPRD). 2001. Wallowa County State Parks Master Plan. June 2001.

Oregon Parks and Recreation Department (OPRD). 2003. 2003-2007 Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP). Oregon Parks and Recreation Department. January 2003.

Oregon Parks and Recreation Department (OPRD). 2013. Comments on Preliminary Licensing Proposal (PLP) Wallowa Falls Hydroelectric Project. December, 30, 2013.

PacifiCorp. 1993. Biological Evaluation Plant Species Wallowa Falls Dam Reparation Project. Prepared by Campbell-Craven Environmental Consultants. April 15, 1993.

PacifiCorp Energy. 2011. Lewis River – Annual Bull Trout Monitoring Report.

PacifiCorp. 2011a. Wallowa Falls Hydroelectric Project FERC No. P-308 Notice of Intent to Relicense and Pre-Application Document. February 2011. Portland, Oregon.

PacifiCorp. 2011b. Response to Additional Information Request - Wallowa Falls Hydroelectric Project Outage Report from 3/1/1986 through 7/31/2011. Filed electronically with FERC on August 8, 2011.

PacifiCorp. 2011c. Wallowa Falls Hydroelectric Project Wallowa Falls Hydroelectric Project FERC Project No. P-308 Revised Study Plans – Terrestrial. December 2011. Portland, Oregon. http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/Terrestrial_WF_Revised_SP-FINAL-12.02.11.pdf

PacifiCorp 2012. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Study Progress Report (Draft Technical Report), *Aquatic Resources.* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/WF_Aquatics_Species_Study_Progress_Report_FINAL_12-13-2012.pdf

PacifiCorp 2013a. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Geology and Soils.* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/WF_Geology_Soils_Updated_Study_Report.pdf

PacifiCorp 2013b. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Sediment and Substrate Characterization.* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/WF_Sediment_Substrate_Updated_Study_Report.pdf

PacifiCorp 2013c. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Study Progress Report (Draft Technical Report), *Water Resources* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/02_WF_Water_Resources_Updated_Study_Report.log.pdf

PacifiCorp 2013d. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Aquatic Resources.* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/03_WF_Aquatic_Resources_Updated_Study_Plan.pdf

PacifiCorp 2013e. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Terrestrial* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/05_WF_Terrestrial_Updated_Study_Report.pdf

PacifiCorp 2013f. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Recreation and Land Use* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/06_WF_Recreation_Updated_Study_Report.pdf

PacifiCorp 2013g. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Aesthetic and Visual Resources* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/08_WF_Aesthetics_Updated_Study_Report_Rev.pdf

PacifiCorp 2013h. Wallowa Falls Hydroelectric Project, FERC Project No. P-308, Updated Study Report (Final Technical Report), *Cultural Resources*

PacifiCorp 2013i. Wallowa Falls Habitat Modeling Results *April 25, 2013* http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Wallowa%20Falls/04252013_WF_IFIM_Mod_Results.pdf

PacifiCorp. 2014. Biological Assessment; Wallowa Falls Hydroelectric Project Forebay Maintenance Flushing, prepared by Mason, Bruce and Girard.
Personal Communication between Bill Knox, ODFW, September 2010

Personal Communication between Mark Port and Kendrick Moholt of Bio-Resources, Inc. May 16, 2012. Wallowa County Cooperative Weed Management Area.

Pontius, R., and M. Parker. 1973. Food Habits of the Mountain Whitefish, *Prosopium williamsoni* (Girard). Transactions of the American Fisheries Society, Volume 102, Issue 4, 1973.

Potash, L.L. 1998. Management Recommendations for Moutnan grape-fern (*Botrychium montanum* W.H. Wagner) v 2.0. http://www.blm.gov/or/plans/surveyandmanage/MR/VascularPlants/section5.htm. Accessed 12.30.13.

Ray, M. 1974. Ethnohistory of the Joseph Band of the Nez Perce Indians: 1805-1905. Petitioner's Exhibit No. 75, Indian Claims Commission Docket No. 186.

Ray, V.F. , G.P. Murdock, B. Blyth, O.C. Stewart, J. Harris, E. Adamson Hoebel, and D.B. Shimkin. 1938. Tribal Distribution in Eastern Oregon and Adjacent Regions. *American Anthropologist* 40(3):384-415.

Randall Rosenberger, Kreg Lindberg. Oregon State University. September 2012.
Ruby, R.H., and J.A. Brown. 1981. *Indians of the Pacific Northwest*. University of Oklahoma Press, Norman.

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.

Regional Sediment Evaluation Team (RSET). 2006. Northwest Regional Sediment

Rosenbeger. 2012. Oregon resident Outdoor Recreation Demand Analysis: 2013-2017: Oregon Statewide Comprehensive Outdoor Recreation Plan Supporting Documentation.

Ruby, R.H., and J.A. Brown. 1981. *Indians of the Pacific Northwest*. University of Oklahoma Press, Norman.

Schalk, R. 1980. Cultural Resource Investigations for the Second Powerhouse Project at McNary Dam, Near Umatilla, Oregon. *Laboratory of Archaeology and History Project Report No. 1*. Pullman, Washington State.

Servizi, J. A., and Martens, D. W. 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.

Sigler, J. W., T. C. Bjornn, and F. H. Everest. 1984. Effects of Chronic Turbidity on Density and Growth of Steelheads and Coho Salmon. Transactions of the American Fisheries Society 113: 142-150.

Spinden, H. 1908. The Nez Perce Indians. *Memoirs of the American Anthropological Association*. 2:165-274.

Stone, Katharine. 2010. Martes americana. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/animals/mammal/maam/all.htm/ [January 8, 2014].

Suphan, R. 1974. Ethnological Report on the Umatilla, Walla Walla, and Cayuse Indians. In *Oregon Indians II*, S.A. Horr (ed.), pp. 85-180. Garland Publishing Inc., New York.

Surber, E. W. 1936. Rainbow trout and bottom fauna production in one mile of stream. American Fisheries Society 66: 193-202.

U.S Fish and Wildlife Service. 1985. Revised Recover Plan for Macfarlane's Four-O'Clock (*Mirabilis macfarlanei*). United States Fish and Wildlife Service, Portland, OR. March 27, 1985.

United States Forest Service (USFS). 1990. *Wallowa-Whitman National Forest Land and Resource Management Plan*. U.S. Forest Service. Baker City, Oregon.

USFS. 1995. *Eagle Cap Wilderness Stewardship Plan*. Eagle Cap Ranger District, Wallowa-Whitman National Forest. January 1995.

U.S. Fish and Wildlife Service. 1998a. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale. February 1998.

U.S. Fish and Wildlife Service (USFWS). 2002. Bull Trout Draft Recovery Plan. Chapter 11 Grande Ronde River. Region 1, United States Fish and Wildlife Service, Portland, OR. October 2002.

U.S. Fish and Wildlife Service (USFWS). 2006. Gray Wolf Biology Questions and Answers. URL: http://www.fws.gov/home/feature/2007/qandasgraywolfbiology.pdf. (July 11, 2013).

U.S Fish and Wildlife Service (USFWS). 2007. Recovery Plan for Silene spaldingii (Spalding's catchfly). United States Fish and Wildlife Service, Portland, OR. September 2007.

U.S. Fish and Wildlife Service (USFWS 2010). Federally Listed, Proposed, Candidate Species, and Species of Concern under the Jurisdiction of the Fish and Wildlife Service which may occur within Wallowa County, Oregon. Accessed September 11, 2010)

U.S. Fish and Wildlife Service (USFWS). 2011. Whitebark Pine. URL: http://www.fws.gov/mountain-prairie/species/plants/whitebarkpine. (January 17, 2014).

U.S. Fish and Wildlife Service (USFWS). 2013a. Oregon Fish and Wildlife Service Species Fact Sheet: North American wolverine (*Gulo gulo luscus*.) URL: http://www.fws.gov/oregonfwo/Species/Data/NorthAmericanWolverine/. (July 11, 2013).

U.S. Fish and Wildlife Service (USFWS). 2013b. Species Profile: North American wolverine (*Gulo gulo luscus*). Environmental Conservation Online System. URL:http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0FA. (July 11, 2013).

U.S. Fish and Wildlife Service (USFWS). 2014a. Species Profile: Macfarlane's four-o'clock (*Mirabilis macfarlanei*). Environmental Conservation Online System. URL: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q1ZF (January 16, 2014).

U.S. Fish and Wildlife Service (USFWS). 2014b. Species Profile: Spalding's Catchfly (*Silene spaldingii*). Environmental Conservation Online System. URL: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q1P9/ (January 16, 2014).

U.S. Fish and Wildlife Service (USFWS). 2014c. Species Profile: Whitebak pine (*Pinus albicaulis*). Environmental Conservation Online System. URL: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=R00E (January 17, 2014).

U.S. Fish and Wildlife Service (USFWS). 2014d. Species Profile: North American wolverine (*Gulo gulo luscus*). Environmental Conservation Online System. URL: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0FA (January 17, 2014).

U.S. Fish and Wildlife Service (USFWS). 2014e. Canada lynx. U.S. Fish and Wildlife Service Mountain-Prairie Region Endangered Species Program. URL http://www.fws.gov/mountain-prairie/species/mammals/lynx/ (January 17, 2014).

U.S. Fish and Wildlife Service (USFWS). 2014f. Species Profile: Gray Wolf (Canis lupus). Environmental Conservation Online System. URL: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A00D (January 17, 2014).

United States Forest Service. 1990. Land and Resource Management Plan Wallowa-Whitman National Forest. United States Forest Service. URL:http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5260139.pdf.

United States Forest Service (USFS). 1990. *Wallowa-Whitman National Forest Land and Resource Management Plan*. U.S. Forest Service. Baker City, Oregon.
United States Forest Service and Bureau of Land Management. 1995. Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and portions of California (PACFISH).

United States Forest Service. 2005. Threatened, Endangered, and Sensitive Plant Survey Field Guide. United States Forest Service. March 2005. Washington D.C.

United States Forest Service. 2011. Wallowa Falls Hydroelectric Project, FERC Project No. 308-005 Comments on Pre-Application Document, Comments on Scoping Document No.1, and Study Requests. URL: http://www.pacificorp.com/wallowafalls

United States Forest Service (Forest Service). 2011. Comment letter sent by Forest Service to FERC responding to the pre-application document, scoping document, and study request letter. June 23, 2011.

United States Forest Service (USFS). 2012. "Wallow-Whitman National Forest." http://www.fs.usda.gov/recmain/wallowa-whitman/recreation. Accessed November 2012.

Verts, B.J. and L.N. Carraway. 1998. Land Mammals of Oregon. University of California Press, Berkeley and Los Angeles, California.

Wahl, T., A. Clemmens, J. Replogle, and M. Bos. 2000. WinFlume — Windows-Based Software for the Design of Long-Throated Measuring Flumes. Fourth Decennial National Irrigation Symposium, American Society of Agricultural Engineers, Nov. 14-16, 2000, Phoenix, Arizona.

Walker, D. 1985. *Conflict and Schism in Nez Perce Acculturation: A Study of Religion and Politics*. Washington State University Press, Pullman. Revised Edition.

Wallowa Falls Hydroelectric Project Files. PacifiCorp Archives. Portland, *Oregon*.

Wallowa County. 2003. Wallowa County Comprehensive Plan. Appendix 8-1: Recreation Overview. Adopted by the Wallowa County Board of Commissioners, May 21, 2003.

Wallowa County Planning Department. 2003. *Wallowa County Comprehensive Plan and Zoning Ordinance Articles*.

Washington National Heritage Program (WNHP). 1997. Silene spaldingii fact sheet. URL: http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/sisp.pdf. (April 29, 2013).

Weis, P.L, et al. 1976. Mineral Resources of the Eagle Cap Wilderness and Adjacent Areas, Oregon. US

Wells, A.F. 2006. Deep Canyon and Subalpine Riparian and Wetland Plant Associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests. Gen. Tech. Rep. GTR-PNW-682. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 277 p.

Whiteaker, L., J. Henderson, R. Holmes, L. Hoover, R. Lesher, J. Lippert, E. Olson, L. Potash, J. Seevers, M. Stein, and N. Wogen. 1998. Survey protocols for survey and manage strategy 2 vascular plants. Version 2.0. December, 1998.

Williamson, Nakia. 2014. The Nez Perce Tribe, *The Traditional Use and Ethnographic Study of the Wallowa Falls FERC Relicensing.*

Zucker, J., K. Hummel, and B. Hogfoss. 1983. *Oregon Indians: Culture, History and Current Affairs*. Western Imprints (Oregon Historical Society), Portland, *Oregon*.

7.0 LIST OF PREPARERS

Russ Howison – Geology & Soils, Recreation (Sr. Environmental Scientist, B.S.; Environmental Geography)

Brent Black – Geology & Soils (Engineering Geologist, M.S.; Geology)

Ken Carlson - Water Resources (Sr. Water Resources Scientist, M.S.; Environmental Engineering and Science)

Frank Shrier – Aquatic Resources (Principal Aquatic Scientist, M.S.; Fish Ecology)

Jeremiah Doyle – Aquatic Resources (Environmental Scientist, B.A.; Environmental Studies)

Mike Bonoff – Aquatic Resources (Biological Assessment, Sr. Biologist, M.S., Aquatic Biology)

Kaylea Foster - Instream Flow and Habitat (Environmental Scientist, M.S.; Hydrology)

Kendel Emmerson – Terrestrial Resources (Wildlife Biologist, B.S.; Wildlife Science)

Mark Greenig –Land Use, Aesthetics and Visual Resources (Environmental Planner, B.S.; Landscape Architecture, M.U.P Urban Planning)

Briana Weatherly – Aquatic Resources, Sediment & Substrate Characterization (Manager – Engineering & Environmental, B.A.; Environmental Policy and Planning)

Kathy Dube' – Aquatic Resources, Sediment & Substrate Characterization (Senior Geologist/Geomorphologist, M.S.; Geological Sciences)

Kimberly Demuth - Cultural (Technical Director of Cultural Resources Management, M.S.; Historic Preservation of Architecture)

Lucy Zuccotti – Cultural, 2012 fieldwork (Project Scientist, M.A.; Anthropology)

Katie Tipton – Cultural, 2012, 2013 fieldwork (Assistant Staff Scientist, B.A.; Anthropology)

Jennifer Flathman – Cultural, 2012, 2013 fieldwork (Project Architectural Historian, M.S.; Historic Preservation)

Jennifer Ferris – Cultural, 2013 fieldwork (Project Archaeologist, M.A.; Anthropology)

Don Craig – Cultural (Project Archaeologist, M.S.; Archaeology)

Kimberly McCune - Sr. Project Coordinator (B.S.; Business Administration/Law)

8.0 CONSULTATION DOCUMENTATION

Over the course of the ILP, PacifiCorp has consulted with a variety of stakeholders (agencies, tribes, non-governmental organizations, public) to discuss the Project, studies and protection, mitigation and enhancement measures (PM&Es). The consultations were divided among the various resources areas (aquatic, terrestrial, cultural, water resources, land use, aesthetics and recreation). The resource groups were notified or significant events, periodic updates, meeting announcements, and opportunities for written comments – for both ILP required and non-required events. As the Federal Energy Regulatory Commission's (FERC or Commission) non-federal representative for informal consultation under Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act, PacifiCorp informally consulted with the appropriate agencies and tribes as part of the resource groups during study plan implementation and results reporting. A list of the parties involved in each of the resource groups or receiving communications about the resource group activities is presented below.

CULTURAL RESOURCES GROUP

Organization	Contact Name
Nez Perce, Tribe P.O. Box 305 Lapwai, ID 83540-0365	Keith Baird
Confederated Tribes of the Colville P.O. Box 150 Nespelem, WA 99155	Arrow Coyote
Catherine E. Dickson Confederated Tribes of the Umatilla Indian Reservation 46411 Timine Way Pendleton, Oregon 97801	Catherine Dixon, Principal Investigator Cultural Resources Program
Cardno-Entrix 200 1st Avenue W, Suite 500 Seattle, WA 98119	Kimberly Demuth, Technical Director – Cultural Resources management / Principal, Vice President
Wallowa-Whitman National Forest PO Box 905 Joseph, OR 97846	Tony King, Zone Archaeologist
Cornforth Consultants 10250 SW Greenburg Road, Suite 111 Portland, OR 97223	Brent Black

AQUATICS RESOURCES GROUP

Organization	Contact Name
USFWS, La Grande Fish & Wildlife 3502 Hwy 30 LaGrande, OR 97850	Gretchen Sausen
Oregon Department of Fish & Wildlife 3406 Cherry Avenue, NE Salem, OR 97303	Ken Homolka
Oregon Department of Fish & Wildlife 107 20th Street La Grande, OR 97850	Elizabeth Moats, Hydropower Coordinator NE Region
Oregon Department of Fish & Wildlife 3406 Cherry Avenue, NE Salem, OR 97303	Tim Hardin
Oregon Department of Fish & Wildlife Enterprise Field Office 65495 Alder Slope Road Enterprise, OR 97828	Jeff Yanke
CH2M Hill 2020 SW Fourth Avenue Suite 300 Portland, OR 97201-4973	Ken Carlson
CH2M Hill 1100 112th Avenue NE, Suite 500 Bellevue, WA 98004	Mark Greenig
PacifiCorp Energy 105 Merwin Village Court Ariel, WA 98603	Jeremiah Doyle, Aquatic Scientist
PacifiCorp Energy 925 South Grape Street Medford, OR 97501	Kaylea Foster, Aquatic Scientist (Instream Flow Study)

LAND USE, AESTHETICS AND RECREATION RESOURCES GROUP

Organization	Contact Name
US Forest Service PNW Forestry and Range Sciences Lab 1401 Gekeler Lane La Grande, OR 978450	Daniel Gonzales
Wallowa-Whitman National Forest PO Box 905 Joseph, OR 97846	Sweyn Wall
Oregon Parks and Recreation Department 72214 Marina Lane Joseph, Oregon 97846	Todd Honeywell

USDOI NPS, Pacific West Region 909 1st Avenue Seattle, WA 98104-1059	Susan Rosebrough, Outdoor Recreation Planner
Oregon Parks and Recreation Department 725 Summer St NE, Suite C Salem OR 97301	Jim Morgan
CH2M Hill 1100 112th Avenue NE, Suite 500 Bellevue, WA 98004	Mark Mullins

TERRESTRIAL RESOURCES GROUP

Organization	Contact Name
PacifiCorp Energy 825 NE Multnomah St., Suite 1500 Portland, OR 97232	Kendel Emmerson, Sr. Environmental Scientist
PacifiCorp Energy 825 NE Multnomah St., Suite 1500 Portland, OR 97232	Russ Howison, Sr. Environmental Scientist
Bio-Resources, Inc. 3060 NE 1st Street Enterprise, OR 97828	Kendrick Moholt

OTHER GROUPS

Organization	Contact Name
Oregon Dept. of Land Conservation and Development	Juna Hickner, Coastal State-Federal Relations Coordinator
FERC – Portland Regional Office 805 SW Broadway, Suite 550 Portland, OR 97205	Matt Cutlip
Oregon Department Environmental Quality 700 SE Emigrant Ave - Suite 330 Pendleton, OR 97801	John Dadoly (Water Quality)
CH2M Hill 2020 SW Fourth Avenue Suite 300 Portland, OR 97201-4973	Ken Carlson, Water Resources Scientist
Cornforth Consultants 10250 SW Greenburg Road, Suite 111 Portland, OR 97223	Brent Black (Geology & Soils)
PacifiCorp Energy 825 NE Multnomah St., Suite 1500 Portland, OR 97232	Kendel Emmerson, Environmental Analyst (Sediment & Substrate Characterization)

A summary of the consultation efforts from the Updated Study Report period (January, 2014) to the filing of the FLA (February 2014) are listed below. This list does not include consultation that occurred via email or phone. Supporting consultation documents are available upon request.

Date	Resource Group/Agency	Type
8/31/2011	Geology, Soils, Water Resources, Aquatics, Terrestrial, Hydrology, Recreation, Cultural, Aesthetics/Land Use	Meeting
10/12/2011	Geology, Soils, Water Resources, Aquatics, Terrestrial, Hydrology, Recreation, Cultural, Aesthetics/Land Use	Meeting Summary
6/12/2012	Instream Flow/Hydrology	Meeting
10/23/2012	Geology, Soils, Water Resources, Aquatics, Terrestrial, Hydrology, Recreation, Aesthetics/Land Use	Meeting
1/15/2013	Geology, Soils, Water Resources, Aquatics, Terrestrial, Hydrology, Recreation, Aesthetics/Land Use	Meeting
1/16/2013	Recreation, Aesthetics/Land Use, Cultural	Meeting
2/27/13	Biological Assessment, wetland survey assessments, map discrepancies	USDA Forest Service Conference Call
4/25/13	Instream Flow, Hydrology, Aquatics	Meeting
6/11/13	Recreation, Aesthetic Resources	Meeting
6/13/13	Instream Flow, Aquatics	Meeting
7/10/13	Instream Flow, Aquatics	Meeting
8/20/13	Kokanee Spawner Assessment Study Plan	ODFW correspondence re comment and recommendation
9/3/13	CZMA Applicability	Correspondence re not subject to review under Coastal Zone Mgmt Act
9/19/13	Stakeholder emailing list	Update of temporary fish weir install
10/1/13	Stakeholder emailing list	Announcement of filing PLP with FERC
10/17/13	Stakeholder emailing list	Announcement of filing APE with FERC
11/7/13	Recreation	Meeting re: RRMP
11/8/13	Cultural	Announcement of filing Colville Tribe no concern re APE
11/14/13	Aquatics	Announcement of 2013 Threatened and Endangered Species Annual Report

11/19/13	Stakeholder emailing list	Announcement of filing revised study plan for cultural resources survey to FERC
11/22/13	Consultants and US Forest Service	Request for comment on draft RRMP by 12/2/13
1/14/14	Geology, Soils, Water Resources, Aquatics, Terrestrial, Hydrology, Recreation, Aesthetics/Land Use	Meeting
1/15/14	Geology, Soils, Water Resources, Aquatics, Terrestrial, Hydrology, Recreation, Aesthetics/Land Use	Meeting
1/21/14	Cultural	Call to discuss Umatilla Tribe TCP report
1/21/14	Cultural	Call to discuss Colville Tribe TCP report
1/23/14	Cultural	Call to discuss status of Nez Perce TCP report
1/28/14	Recreation	Conference call regarding Forest Service priority list

Additional documentation of consultation can be found on PacifiCorp's website at: http://www.pacificorp.com/es/hydro/hl/wf.html, "Consultation Record" Tab.