

# Evaluation and Findings Report

401 Water Quality Certification

Wallowa Falls Hydroelectric Project (FERC P-308)

March 2016



State of Oregon  
Department of  
Environmental  
Quality

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# Table of Contents

1. Introduction.....	1
2. Requirements for Certification.....	4
2.1 Applicable Federal and State Law.....	4
3. Summary of Application.....	5
3.1 Applicant Information.....	5
3.1.1 Name and Address of Applicant.....	5
3.1.2 Name and Address of Applicant’s Authorized Representative.....	5
3.1.3 Documents Filed in Support of §401 Application.....	5
3.2 Waters of the State.....	6
3.2.1 Waters Affected by the Project.....	6
3.2.2 Water Rights.....	6
3.2.3 Beneficial Uses.....	6
3.3 Project Lands.....	7
3.4 Aquatic Resources in the Project Vicinity.....	8
3.4.1 Bull Trout.....	10
3.4.2 Kokanee.....	11
3.4.3 Macroinvertebrates.....	11
4. Project Description.....	14
4.1 Existing Project Facilities and Operations.....	14
4.1.1 Existing Project Facilities.....	14
4.1.2 Existing Project Operations.....	16
4.2 Proposed Project Modifications.....	17
4.2.1 Project Tailrace Improvements.....	17
4.2.2 Proposed Project Operations.....	17
4.2.3 Instream Flow Releases.....	17
4.2.4 Forebay Sediment Management Program.....	18
4.2.5 Flow Gage Relocation.....	18
5. Water Quality Standards and Regulations.....	19
5.1 Biologically-Based Numeric Criteria.....	19
5.2 Antidegradation Policy.....	20
5.3 Water Quality Impairment in the Willowa River.....	20
5.3.1 Water Quality Limited Waters.....	20
5.3.2 Oregon Health Authority Listings.....	20
5.4 Water Quality Standards not of Concern.....	21
5.5 Water Quality Standards of Potential Concern.....	22
6. Water Quality Compliance Evaluation.....	24

## Evaluation and Findings Report

6.1 Dissolved Oxygen.....	24
6.1.1 Water Quality Standard.....	24
6.1.2 Application of Water Quality Standard.....	25
6.1.3 Present Conditions.....	25
6.1.4 Applicant’s Position .....	30
6.1.5 DEQ Evaluation .....	30
6.1.6 DEQ Findings.....	30
6.2 Total Dissolved Gas.....	30
6.2.1 Applicable Water Quality Standard .....	30
6.2.2 Application of Water Quality Standard.....	31
6.2.3 Present Conditions.....	31
6.2.4 Applicant’s Position .....	31
6.2.5 DEQ Evaluation .....	31
6.2.6 DEQ Findings.....	31
6.3 Biocriteria .....	33
6.3.1 Applicable Standard .....	33
6.3.2 Application of Standard.....	33
6.3.3 Present Conditions.....	33
6.3.4 Applicant’s Position .....	34
6.3.5 DEQ Evaluation .....	34
6.3.6 DEQ Findings.....	34
6.4 Discoloration, Oily Sheen, Oily Coatings .....	35
6.3.1 Applicable Standard .....	35
6.4.2 Application of Standard.....	35
6.4.3 Present Conditions.....	35
6.4.4 Applicant Position .....	35
6.4.5 DEQ Evaluation .....	35
6.4.6 DEQ Findings.....	36
6.5 Antidegradation .....	37
6.5.1 Water Quality Standard.....	37
6.5.2 Application of Standard.....	40
6.5.3 Present Conditions.....	41
6.5.4 Applicant’s Position .....	41
6.5.5 DEQ Evaluation .....	41
6.6 Temperature.....	41
6.6.1 Applicable Standard .....	41
6.6.2 Application of Standard.....	44
6.6.3 Present Conditions.....	45

## Evaluation and Findings Report

6.6.4 Applicant’s Position .....	46
6.6.4 DEQ Evaluation .....	46
6.7 Turbidity .....	47
6.7.1 Applicable Standard .....	47
6.7.2 Application of Standard.....	47
6.7.3 Present Conditions.....	48
6.7.4 Applicant’s Position .....	48
6.7.4 DEQ Evaluation .....	48
7. Evaluation of Compliance with Sections 301, 302, 303, 306 and 307 of the Federal Clean Water Act .....	49
8. Evaluation of Compliance with Other Requirements of State Law .....	50
8.1 Department of State Lands .....	50
8.2 Department of Fish and Wildlife .....	50
8.3 Department of Land Conservation and Development .....	51
8.4 Department of Environmental Quality .....	51
8.5 Water Resources Department .....	52
9. Public Comment.....	53
10. Conclusions and Recommendation for Certification .....	53
11. References.....	54

# 1. Introduction

The Oregon Department of Environmental Quality (DEQ) prepared this Evaluation and Findings Report in response to an application for water quality certification submitted by PacifiCorp (Applicant) for a new license from the Federal Energy Regulatory Commission (FERC Project P-308). The purpose of this report is to determine what effects, if any, the proposed Project may have on water quality. As allowed by Section 401 of the Clean Water Act, DEQ may condition the operation of the Project, as necessary, to comply with Oregon water quality standards, applicable portions of the Clean Water Act, and other relevant provisions of state law.

DEQ received the application on April 29, 2015. DEQ has one year from receipt of the application to render a decision on the Applicant's request for water quality certification.

The Wallowa Falls project is located in the upper portion of the Wallowa River Subbasin of the Grande Ronde River Basin, upstream of Wallowa Lake on the East and West Forks of the Wallowa River and nearby Royal Purple Creek. The project area is in Wallowa County Oregon approximately 7 miles south of the City of Joseph, Oregon (**Figure 1**). It is partly in the Wallowa-Whitman National Forest and adjacent to a portion of Wallowa Lake State Park (**Figure 2**).

The Project is a hydroelectric facility originally constructed in 1921. It is operated in run-of-river mode with water diverted from the East Fork Wallowa River and Royal Purple Creek and discharged from the powerhouse to the West Fork Wallowa River. The average annual generation is 7,000 megawatt-hours (MWh).

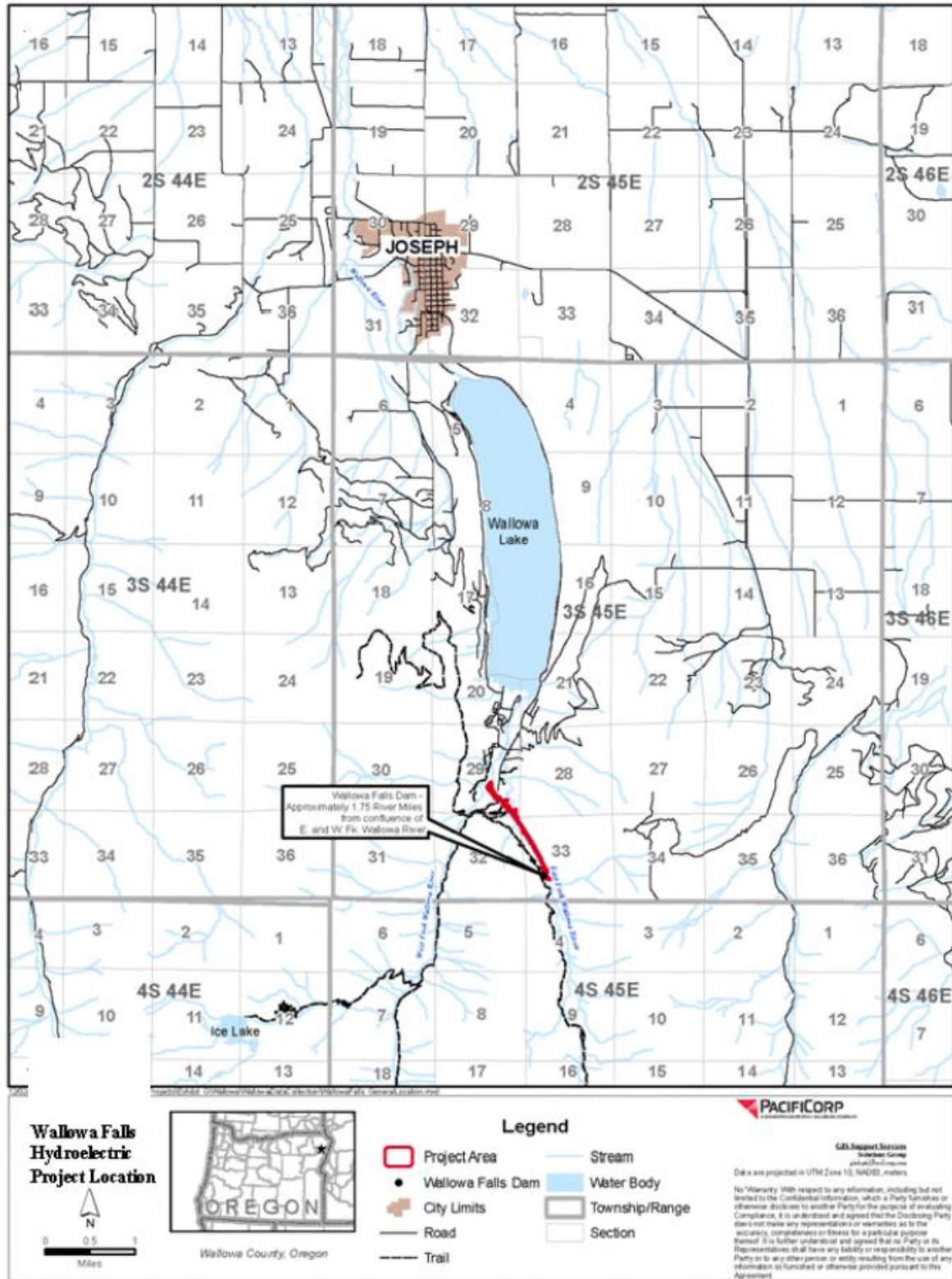


Figure 1: Project Location.

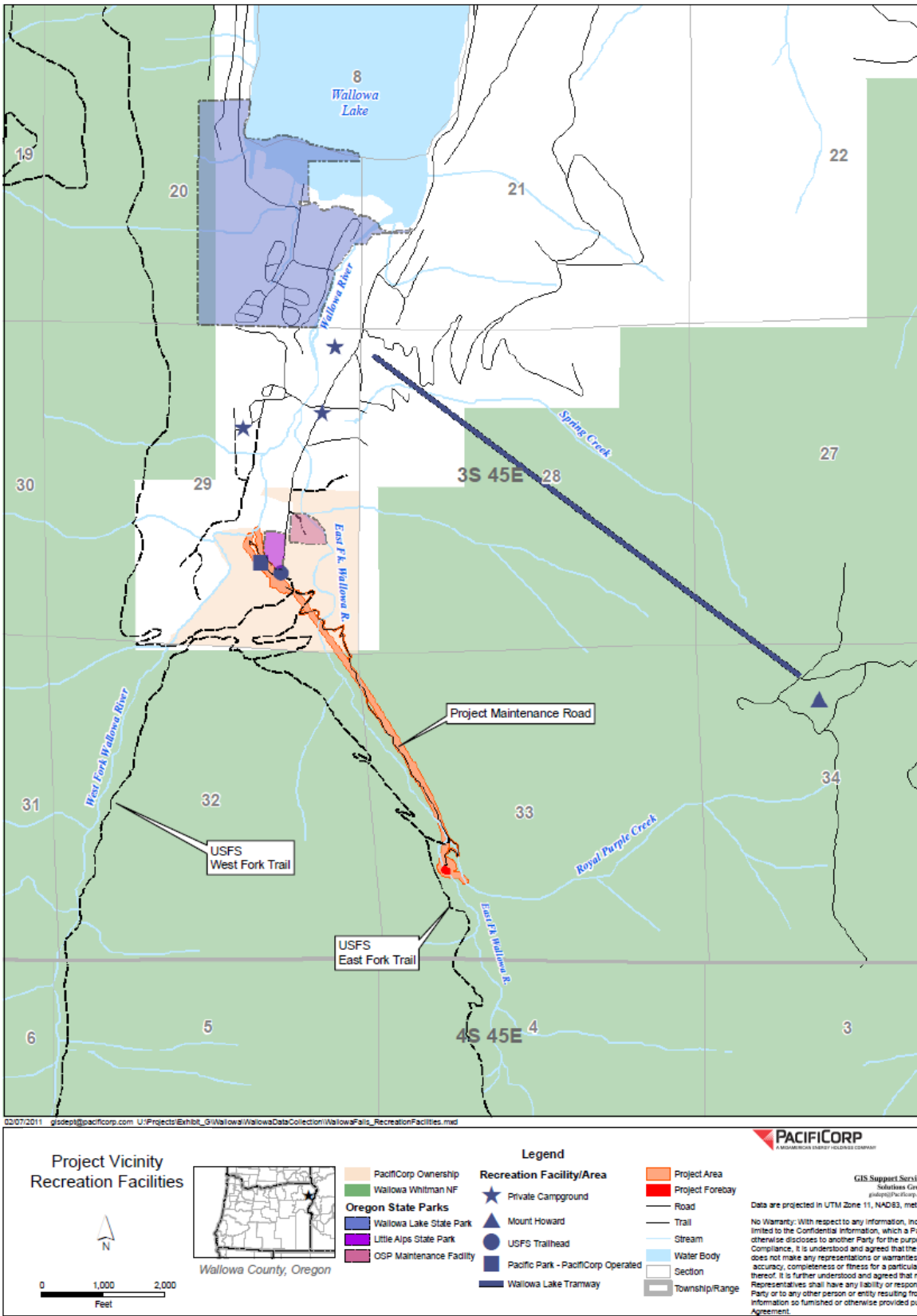


Figure 2: Project vicinity map.



## 2. Requirements for Certification

### 2.1 Applicable Federal and State Law

PacifiCorp has applied to the Federal Energy Regulatory Commission (FERC) for a new license for the existing 1.1 megawatt Wallowa Falls hydroelectric facility on the East Fork Wallowa River in Wallowa County, Oregon. Section 401 of the Federal Clean Water Act requires that an applicant for a federal permit or license to conduct any activity which may result in any discharge into navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates. The state water pollution control agency having jurisdiction over the navigable waters must certify that the project will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of the Clean Water Act.

The Oregon Department of Environmental Quality (DEQ) has jurisdiction for issuing a §401 Water Quality Certification in the State of Oregon. In order for DEQ to issue a 401 certification, the Applicant (PacifiCorp) must ensure that any actions of project development and operations comply with the water quality standards set forth in OAR Chapter 340, division 041 as well as the applicable provisions of sections 301, 302, 303, 306, and 307 of the Clean Water Act.

#### **Federal Requirements**

Sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act: These sections prescribe effluent limitations, water quality related effluent limitations, water quality standards and implementation plans, national standards of performance for new sources, and toxic and pretreatment effluent standards.

#### **State Requirements**

Oregon Administrative Rules (OAR) 340-041 and 340-048-0005 to 340-048-0050: These rules were adopted by the Environmental Quality Commission (EQC) to prescribe the state's water quality standards (OAR 340-041) and procedures for receiving, evaluating, and taking final action upon a §401-certification application (OAR 340-048). The rules include requirements for general information such as the location and characteristics of the project, as well as confirmation that the project complies with appropriate local land use plans and any other requirements of state law that have a direct or indirect relationship to water quality.

ORS 468B.040: This state statute prescribes procedural requirements and findings with which DEQ must comply as it makes a decision on a § 401-certification application. This statute makes reference to the federal law requirements, state water quality rules, and other requirements of state law regarding hydroelectric projects.

ORS 197.180(1): This statute requires state agency actions to be consistent with acknowledged land use plans and implementing regulations, or if a plan is not acknowledged, compatible with state land use goals. Findings must support the state agency action.

ORS 543A: This statute establishes procedures among state agencies in the reauthorization of federally licensed hydroelectric projects, including state certification of water quality.

Information which must be included in an application for §401 certification is presented in OAR 340-048-0020(2). The application together with information provided during public comment and interagency coordination is essential to support the following determinations to be made by DEQ pursuant to §401 of the Federal Clean Water Act and state law:

- A determination whether to issue or deny certification.
- Determination of conditions appropriate to include in any granted certificate.
- Preparation of findings as required by ORS 468B.040 and ORS 197.180(1).

## 3. Summary of Application

### 3.1 Applicant Information

#### 3.1.1 Name and Address of Applicant

PacifiCorp  
825 N.E. Multnomah Street, Suite 1500  
Portland, OR 97232  
(503)813-6626

#### 3.1.2 Name and Address of Applicant's Authorized Representative

Russ Howison  
Project Manager, Hydro Licensing  
PacifiCorp  
825 N.E. Multnomah Street, Suite 1500  
Portland, OR 97232  
(503)813-6626

#### 3.1.3 Documents Filed in Support of §401 Application

PacifiCorp has filed the following key documents in support of its §401 certification application for the licensing of the Project:

*Application for Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and ORS468B.040 for the Wallowa Falls Hydroelectric Project (FERC No. P-308) in Wallowa County, Oregon. PacifiCorp, Portland, Oregon. 4/24/15.*

*Revised Biological Assessment for the Wallowa Falls Hydroelectric Project, filed under license application P-308, 3/20/15.*

*Final License Application with Modification to Proposed Action for the Wallowa Falls Hydroelectric Project, FERC Project P-308, 2/10/15.*

*Response to Request for Additional Information for the Wallowa Falls Hydroelectric Project P-308, 10/22/14.*

*Biological Assessment for Bull Trout for the Wallowa Falls Hydroelectric Project P-308, 2/28/14.*

*Final License Application for the Wallowa Falls Hydroelectric Project P-308, 2/28/14.*

*Wallowa Falls Hydroelectric Project (P-308) Updated Study Report Meeting Summary for January 14 and 15, 2014. 2/3/14.*

*PacifiCorp Submits its Licensing Proposal for Integrated Licensing Process for the Wallowa Falls Hydroelectric Project No. P-308. 10/1/13.*

*Initial Study Report Meeting Summary (January 15 and 16, 2013), 2/4/13.*

*ILP Wallowa Falls Hydro project (FERC Project No. 308) Initial Study report under P-308. 1/2/13.*

*Wallowa Falls Hydroelectric Project No. P-308 Revised Study Plans, December 2011.*

*Wallowa Falls Hydroelectric project No. P-308 Proposed Study Plans, August 2011*

## **3.2 Waters of the State**

### **3.2.1 Waters Affected by the Project**

The Wallowa River Basin has a drainage area of approximately 950 square miles from its headwaters in the Wallowa Mountains to its confluence with the Grande Ronde River in the northeast corner of the State of Oregon.

The Wallowa Falls Project dam is located at approximately river mile 1.8 on the East Fork Wallowa River (**Figure 1**). A penstock carries the diverted water from the dam approximately 1.1 mile to the powerhouse, which discharges to the West Fork Wallowa River approximately 1/2 south of the confluence of the east and west forks. The Wallowa River flows approximately 3/4 mile from the confluence of the east and west forks to Wallowa Lake, and continues approximately 50 miles north to its confluence with the Grande Ronde River.

### **3.2.2 Water Rights**

PacifiCorp has three water rights for a total of 16 cfs from the East Fork Wallowa River and Royal Purple Creek to be used for power generation at the Project site. The seniority dates range from February 16, 1920 to February 29, 1928.

### **3.2.3 Beneficial Uses**

Designated beneficial uses for the Grande Ronde River and its tributaries (including the Wallowa River) are given in OAR-041-0260, Table 260A and apply to all waters within the Project area (**Table 1**).

**Table 1: Grande Ronde River Basin Beneficial Uses**

<b>Beneficial Uses</b>	<b>All Basin Waters</b>
Public Domestic Water Supply <sup>1</sup>	X
Private Domestic Water Supply <sup>1</sup>	X
Industrial Water Supply	X
Irrigation	X
Livestock Watering	X
Fish & Aquatic Life <sup>2</sup>	X
Wildlife and Hunting	X
Fishing	X
Boating	X
Water Contact Recreation	X
Aesthetic Quality	X
Hydro Power	X
Commercial Navigation & Transportation	

<sup>1</sup>With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards.

<sup>2</sup>See also Figure 260A for fish use designations for this basin.

Beneficial uses in the Grande Ronde River Basin are further defined by the Fish Use Designation maps in OAR Chapter 340, Division 041, Figure 151A. This map designates waters above Wallowa Lake as Bull trout spawning and rearing habitat.

### 3.3 Project Lands

The Project facilities within the current FERC project boundary include:

- Dam and Forebay, located on U.S. Forest Service (USFS) land
- Penstock, located on USFS and PacifiCorp land
- Powerhouse, located on PacifiCorp land
- Tailrace, located on PacifiCorp land, with a portion proposed to be moved to Boy Scouts of America property

PacifiCorp proposed to revise the Project boundary to include the proposed new tailrace alignment and other Project features that are not in the current boundary, such as the Royal Purple Creek diversion, forebay access road, and new tailrace alignment. The proposed project boundary will have a total 26.4 acres, including 13.3 acres of private land owned by PacifiCorp, 0.4 acres of private land owned by the Boy Scouts of America, and 12.7 acres of federal land managed by the Wallowa Whitman National Forest.

### 3.4 Aquatic Resources in the Project Vicinity

Fish species observed in the East Fork, West Fork and Wallowa River in the Project area vicinity include rainbow trout, mountain whitefish, kokanee, brook trout, sculpin, and bull trout. These species of fish have been observed in the lower East fork below the waterfall that forms a fish migration barrier, and the Project tailrace channel (**Figure 3**). Rainbow trout and Brook trout are the only fish species observed in the East Fork above the fish passage boundary (**PacifiCorp, 2012**). Bull trout are discussed in **Section 3.4.1**, and Kokanee are discussed in **Section 3.4.2**. Macroinvertebrate studies are discussed in **Section 3.4.3**.

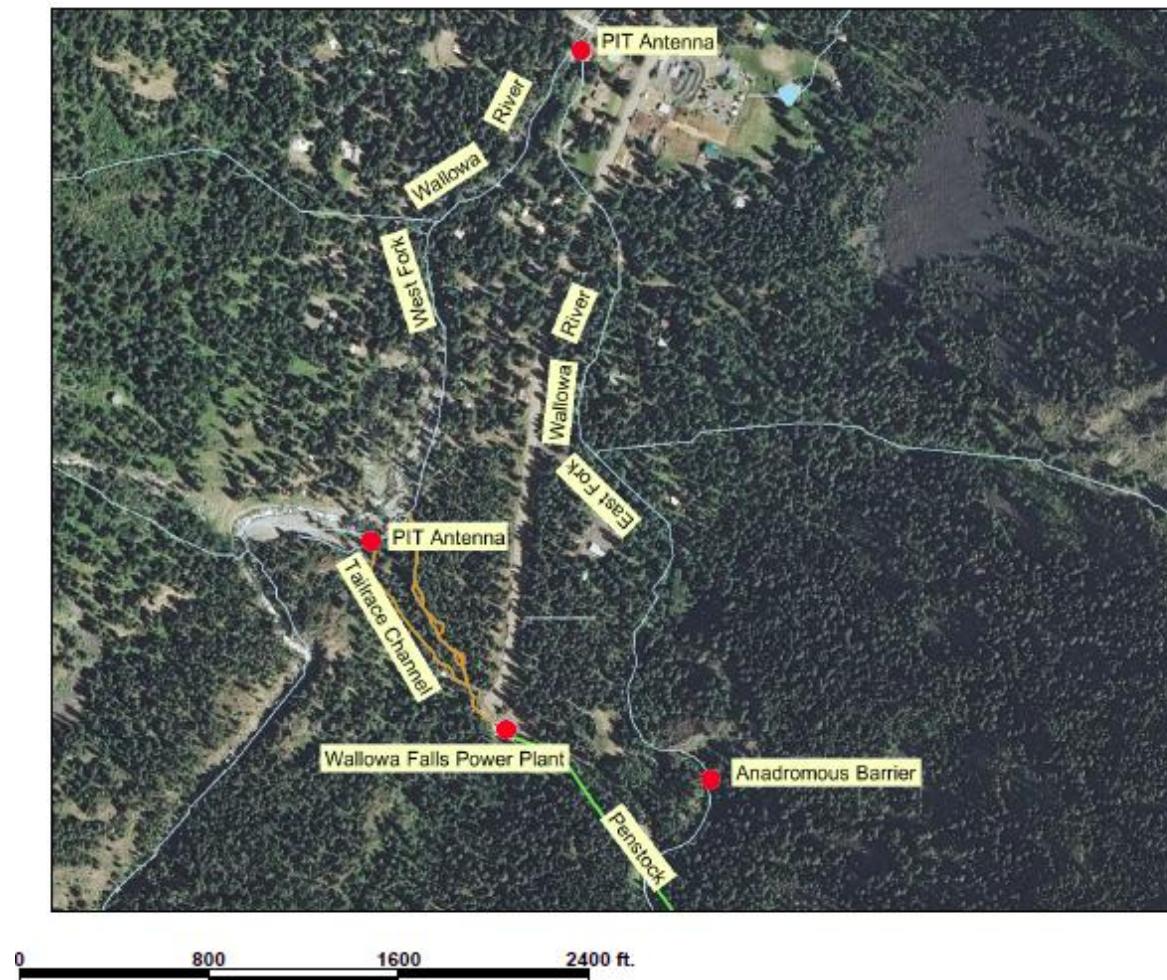
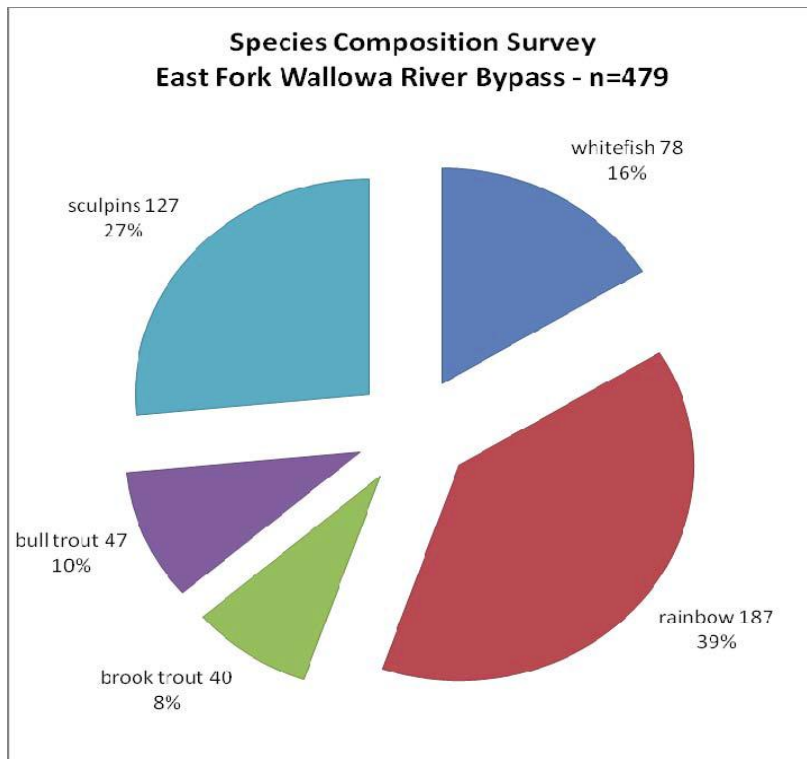
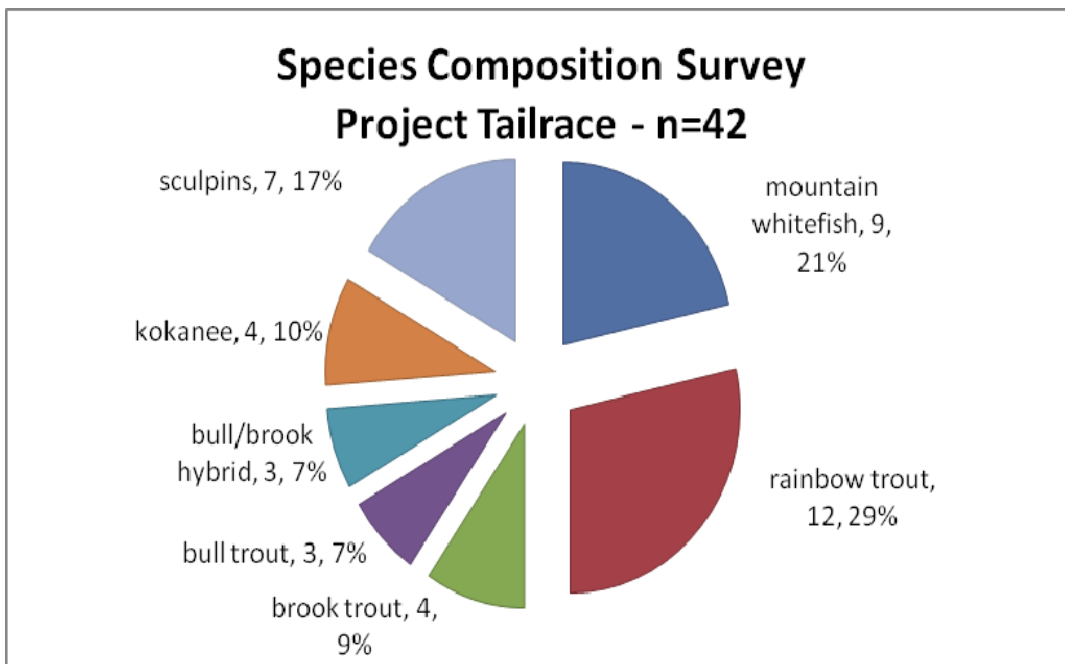


Figure 3: Map of fish survey stream reaches and features.

**Figures 4 and 5** show the relative abundance of fish observed during surveys conducted in the East Fork bypass reach and the Project tailrace (**PacifiCorp, 2012**).



**Figure 4: Fish species composition in East Fork Wallowa River Bypass Reach, 2012.**



**Figure 5: Fish species composition in Project Tailrace, 2012.**

### 3.4.1 Bull Trout

Bull trout were first listed as threatened under the Endangered Species Act (ESA) on June 10, 1998. A final ruling on Critical habitat for Bull trout in the coterminous United States was designated on October 18, 2010. This critical habitat designation included lower portions of the East Fork and West Fork Wallowa Rivers. The waterfall migration barrier on the East Fork appears to define the upstream limit of designated Critical Habitat for Bull trout (**USFWS, 2011**). This conclusion fits with PacifiCorp observations that Bull trout are not present in the Project Forebay or within the East Fork between the Forebay and the waterfall migration barrier.

The specific strain or local population origin of Bull trout inhabiting the Project is not known. The native stock of Bull trout was thought to be extirpated by the late 1950's during an eradication effort to reduce predation and competition on rainbow trout in Wallowa Lake. An introduction program for Bull trout and Dolly Varden from an Alaska fish hatchery was attempted without success from 1968-1978 (**Buchanan et al., 1997**). In 1997, ODF&W released 600 Bull trout ranging in size from 70-380 mm into Wallowa Lake. These fish were salvaged from a decommissioned hydroelectric plant's power canal on Big Sheep Creek in the nearby Imnaha River drainage. Catches of Bull trout were observed in Wallowa Lake creel surveys until 2004. In 2005, Bull trout in Wallowa Lake were again identified as extirpated (**Goodson et al., 2005**). However, Bull trout were observed in the East Fork Wallowa river below the migration barrier and the project Tailrace in 2010, 2012 and 2013 during fish surveys conducted by PacifiCorp in support of the re-licensing proposal. Due to the fact that fish captured and tagged in the 2012 survey were not present in the group of fish captured in 2013, and two large migratory-sized bull trout were captured just below the migration barrier waterfall, the population is assumed to have a migratory component. The 2013 survey results suggest that most of the bull trout captured are likely rearing progeny of fish exhibiting life history forms that migrate in and out of the East Fork to the Wallowa River and Wallowa Lake (**PacifiCorp, 2015**).

Bull trout spawning activity has been directly observed within the project area. In September 2010, PacifiCorp biologists observed a pair of adult bull trout actively constructing a redd in the East Fork bypass reach approximately 650 feet upstream of the confluence with the West Fork (**PacifiCorp, 2014a**). Pacificorp biologists also captured two adult (male and female) bull trout within the Project tailrace in 2012. No redds were observed near this pair, but the timing of subsequent detections of tagged fish in the East Fork bypassed reach suggested spawning at that time as well (**PacifiCorp, 2014a**).

Based on data collection and observations, and discussion with agency biologists, bull trout life stage periodicity/seasonal activity suggest that peak spawning in the East fork can begin in early September and continue through October. Peak egg incubation can continue through March and fry emergence can continue through May. Life stage periodicity reflects migration of fluvial/adfluvial forms from the Wallowa River or Wallowa Lake in May and June (**PacifiCorp, 2015**).

After working with a multi-agency group that worked on recommendations for changes to project facilities and operations that would benefit fisheries (bull trout in particular), PacifiCorp agreed to the following fish protection and enhancement actions:

- Modified instream flow releases - minimum flow releases in the bypass reach of the East Fork will increase from the current level of 0.5 to 0.8 cfs, to 4 cfs November through April and 5 cfs May through October. The greatest benefit will be during August through October when there is no spill over the diversion dam and the bypassed flows

are essentially the only water in the East Fork. It is envisioned that this increase in flow will provide significant increases to spawning, rearing and adult bull trout as well as increases in spawning habitat for Kokanee.

- Bull Trout Population and Genetics Monitoring – Conduct periodic monitoring to assess rate of brook trout introgression in the bull trout population residing in the East Fork and West Fork Wallowa River. Monitoring to occur during years 2 and 15 after license issuance.
- Powerhouse Tailrace Facilities Improvements – In order to eliminate the potential for stranding of bull trout and other fish in the Project Tailrace during outages that involve the closure of the penstock intake head gate, PacifiCorp plans to construct a fish passage barrier at the terminus of the new tailrace channel.
- Project Forebay Sediment Management Program – PacifiCorp plans to change the timing and methods used to flush sediment from the Project forebay. Flushing has been performed during low water periods to allow better access to the forebay slide gate at the bottom of the dam. This schedule caused flushing of sediment to potentially overlap with bull trout spawning. The proposal in the new license application includes a plan to flush the forebay annually during the high water period (June) and to limit the length of the flushing to a 24 to 72 hour period. It is thought that these flushing events will mimic natural flushing events occurring during the high water period and have minimal impacts on fish.

### 3.4.2 Kokanee

Kokanee are land-locked sockeye salmon that live in lakes and generally spawn in streams. Wallowa lake has a significant population of Kokanee that migrate up the Wallowa River to spawn during late August through October. Kokanee spawning was documented in the project area by a PacifiCorp field survey team in September 2015. Kokanee were observed actively constructing redds and spawning in the lower 130 feet of the tailrace channel and the lower 650 feet of the East Fork by-passed reach (**Figure 3**). In 2013 PacifiCorp conducted eight spawning surveys in Wallowa River above the lake and the east and west forks up to the waterfall migration barriers on each fork during the months of August to November. The survey results revealed that over 80 percent of the adult spawning Kokanee were observed in the Wallowa River between the lake and the confluence of the east and west forks.

### 3.4.3 Macroinvertebrates

Aquatic macroinvertebrate samples were collected in August 2013 from three sites in the East Fork; above the Project forebay, middle of bypass reach, and lower end of East Fork bypass reach (**PacifiCorp, 2014a**). Samples were analyzed for aquatic insect taxa composition, taxa relative abundance, and associated metrics. **Figures 6-8** display the composition of the most common 3-4 genera present at each sample location.

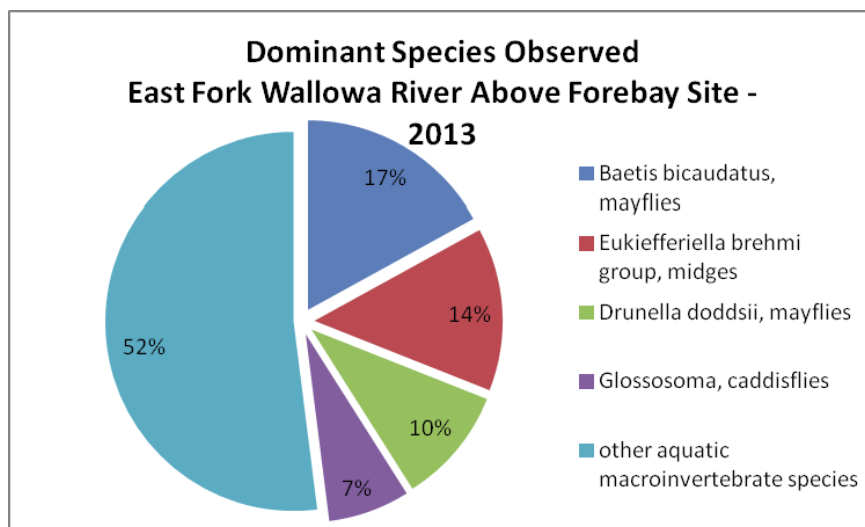
The taxa in the East Fork above the Project forebay was dominated by Ephemeroptera (mayflies), Chironomidae (midges), and Trichoptera (caddisflies) with the four most common genera shown in **Figure 6**. A total of 41 different aquatic macroinvertebrate taxa identified at this site (most identified to species or genera).



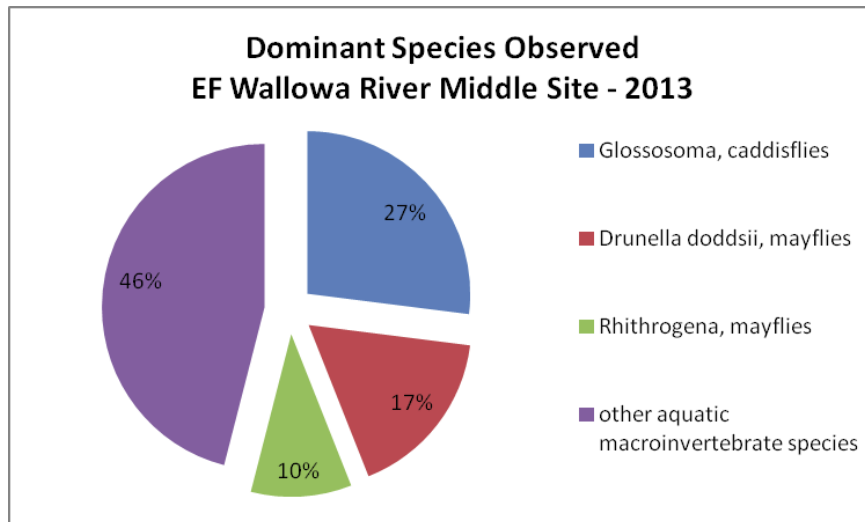
The taxa composition of the middle portion of the bypassed reach was dominated by Ephemeroptera (mayflies) and Trichoptera (caddisflies). **Figure 7** shows the three most common genera. Over 50 different taxa were identified at the site.

The taxa composition in the lower East Fork bypassed reach was dominated by Ephemeroptera (mayflies), Chironomidae (midges), and Oligochaeta (segmented worms). **Figure 8** shows the three most common genera. Over 57 different taxa were identified at the site.

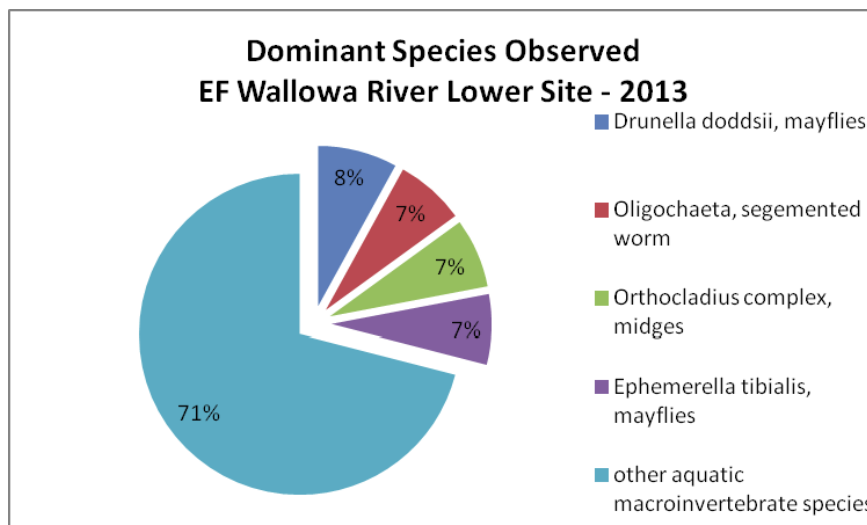
The results of the macroinvertebrate study indicate that taxa richness and diversity generally increase in the downstream direction (**Pacificorp, 2015**). Sixty percent of the overall taxa composition at the upper site, 83 percent at the middle site, and 48 percent at the lower site consisted of caddisflies, mayflies or stoneflies known to have stringent habitat requirements in terms of low water temperature and high dissolved oxygen content.



**Figure 6: Macroinvertebrate population composition, East Fork Wallowa River above forebay, August 2013, Pacificorp, 2014a.**



**Figure 7: Macroinvertebrate population composition, East Fork Wallowa River middle bypass reach site, August 2013, Pacificorp, 2014a.**



**Figure 8: Macroinvertebrate population composition, East Fork Wallowa River lower bypass reach site, August 2013, Pacificorp, 2014a.**

## 4. Project Description

### 4.1 Existing Project Facilities and Operations

#### 4.1.1 Existing Project Facilities

The Project was built in 1921 with one turbine having a generating capacity of 800 kilovolts (kVA). The current Project turbine can generate up to 1.1 megawatts (MW), and has an annual generation of 7,000 MWh. The original Project license was issued on June 27, 1924 for a period of 50 years. The current license was issued on August 28, 1986 and expires on February 28, 2016 (**PacifiCorp, 2015**).

The major Project facilities include a buttressed rock-filled timber crib diversion dam with a 0.2-acre forebay located on the East Fork Wallowa River (**Figure 9**), a steel penstock that carries flows from the dam to the powerhouse (**Figure 10**), a powerhouse with turbine (**Figure 11**), and a tailrace from the powerhouse to the discharge point on the West Fork Wallowa River (**Figure 12**).

Additional Project facilities include a small diversion and discharge pipe carrying water from Royal Purple Creek to the forebay, a transmission line, and a service road along the penstock route. There are no fish ladders or screens associated with the Project (**PacifiCorp, 2015**).



**Figure 9:** Project dam and forebay. (PacifiCorp, 2011)



**Figure 10:** Project penstock crossing over by-passed reach of East Fork Wallowa River. (PacifiCorp, 2011)



**Figure 11:** Project Powerhouse and switchyard with transformers. (PacifiCorp, 2011)



**Figure 12:** Project Tailrace looking downstream from Powerhouse. (PacifiCorp, 2011)

#### **4.1.2 Existing Project Operations**

The project diverts flow from the East Fork Willowa River and Royal Purple Creek for power generation. It operates as a run-of-river project. Up to 15 cfs from the East Fork Willowa River and 1 cfs from Royal Purple Creek enters the steel penstock at the East Fork diversion dam and flows to the powerhouse. Water flows through the turbine in the powerhouse and discharges to the tailrace before entering the West Fork Willowa River. Flows in excess of the diverted volume flow over the dam and down the by-pass reach of the East Fork. These spill flows typically occur May-July.

The current FERC license requires a continuous minimum instream flow release to the by-passed reach of the East Fork Willowa river of 0.5 cfs or the natural inflow to the reservoir, whichever is less. Flow is measured immediately downstream of the dam. To ensure compliance with the current minimum flow requirement of 0.5 cfs, PacifiCorp typically releases approximately 0.8 cfs. Actual flow varies on seasonal conditions and may range between 0.5 and 0.8 cfs. The current FERC license does not specify any daily/seasonal ramping rates, flushing flows, reservoir operations or flood control operations.

The original Project control facilities were manually operated at the site. In 1996, an automated control system was installed. The Project powerhouse operates in an unmanned condition and is controlled by a programmable logic controller. A local Project operator is located in Enterprise, Oregon and visits the project on a monthly basis and as-needed when called by PacifiCorp's

Hydro Control Center in Ariel, WA. The Hydro control Center monitors Project operations remotely and notifies the local operator when needed.

Annual Project maintenance is usually conducted between June and September each year. The maintenance activities include vegetation management, erosion control, road maintenance, and any needed maintenance of the water conveyance system and generating unit. Maintenance activities are coordinated with the Wallowa-Whitman National Forest under a Special-Use Permit issued for the Project by the U.S. Department of Agriculture, Forest Service. Maintenance activities have also included the flushing of accumulated sediment from the forebay. Flushing of the forebay sediment has historically occurred during the months of July or August when low flow conditions allow the forebay to drain completely via a low-level drain pipe.

## **4.2 Proposed Project Modifications**

### **4.2.1 Project Tailrace Improvements**

PacifiCorp has proposed to modify the Project tailrace by realigning it and moving the discharge point in the West Fork Wallowa River north (downstream) to a more stable point in a side channel of the river. This project will include the modification of approximately 700 feet of the existing northern open tailrace channel, construction of approximately 275 feet of new open channel, and construction of a reinforced concrete outfall structure.

The outfall structure will include a velocity barrier which meets National Marine Fisheries Service (NMFS) design requirements to prevent all fish species and life stages from entering the tailrace. The outfall structure will discharge into an energy dissipation channel 10-20 feet long that includes boulders, logs and/or woody debris that will reduce erosion and scour in the West Fork Wallowa River.

After the tailrace realignment is constructed and put into operation, the southern main tailrace channel will be retained to provide for storm water management and drainage. The abandoned portions of the northern tailrace side channels on the north side of the campground road will be reclaimed and restored to match surrounding contours.

### **4.2.2 Proposed Project Operations**

The Project will continue to be operated in run-of-river mode during all times of generation. There be no storage of return flows and they will fluctuate naturally according to East Fork inflow conditions. The automated control system will be set to divert no more than PacifiCorp's water right of 16cfs from the East Fork diversion dam. Proposed modified instream flow releases are described in the following section.

### **4.2.3 Instream Flow Releases**

PacifiCorp is proposing to modify the instream flow release to the East Fork by increasing it to a flow of 4 cfs from November 1 through April 30, and 5 cfs from May 1 through October 31, or a volume equal to the inflow to the forebay, whichever is less. The goal of these proposed minimum flow levels is to provide for additional fish habitat (primarily Bull trout) in the East Fork Wallowa River while allowing for continued power production from the Project. The minimum flow volume levels were agreed upon based on the results of a instream flow study and extensive coordination and input from a multi-agency group that included the Oregon Department of Fish and Wildlife, Oregon Department of Water Resources, Oregon Department

of Environmental Quality, Oregon State Parks, U.S. Fish and Wildlife, and the U.S. Forest Service. The flow study is described in the *Instream Flow Updated Study Report (Final Technical Report)*, PacifiCorp, 2013 (**PacifiCorp, 2013**).

#### 4.2.4 Forebay Sediment Management Program

Flushing of accumulated sediment from the project forebay to the by-pass reach of the East Fork Wallowa River is necessary to prevent the forebay from filling and causing damage to the gates and generation equipment. Annual flushing of approximately 250 to 500 cubic yards of sediment has been performed on a generally annual basis throughout the history of Project operation. PacifiCorp proposes to change the season of forebay flushing from the late summer low flow period to the high flow period in June. Conducting the forebay flushing during high flow will allow excess fine sediment to pass through the system when sediment levels are often naturally elevated. High flows can also distribute the sediment load further downstream and keep it from accumulating in the by-passed reach. Forebay flushing will be limited to a single annual event of 24 to 72 hours in duration. A turbidity monitoring plan will be implemented during flushing operations.

Flushing is currently authorized under a the U.S Army Corps of Engineers (USACE) Nationwide Permit No. 3 and associated DEQ Water Quality Certification Conditions until the FERC hydropower license for the Project is issued. The certification conditions that were added to the general permit have been incorporated into the certification conditions for the renewed hydropower permit and will take precedence when the FERC license is renewed.

#### 4.2.5 Flow Gage Relocation

Flow measurements are currently made at the Project flow gage located immediately downstream of the Project diversion dam on the East Fork Wallowa River. This location serves as the compliance point for the instream flow releases from the Project. In the § 401 Certification application submitted to DEQ on April 29, 2015, PacifiCorp proposed to move this compliance location to the historic USGS gage site in the lower East Fork approximately 1,000 feet upstream of the confluence with the West Fork. This proposal was supported by the agency work group as it will allow the measurement of the flows that reach the best Bull trout habitat area located in the lower East Fork.

PacifiCorp outlined the factors that make the use of this new flow compliance point preferable to the old location (**PacifiCorp, 2015**):

1. Located below the migratory fish barrier and will report flow conditions in the portion of the bypassed reach with the greatest fish use;
2. Avoids high-gradient turbulent channel geometry for gage accuracy;
3. Provides the most suitable channel geometry for gage accuracy;
4. Is easily accessible for efficient and timely maintenance of the gage and downloading of data;
5. Requires no in-water construction as the existing weir structure is fully functional;
6. Has a proven ability to effectively pass sediment and woody debris.

However, in June 2015 Pacificorp proposed to move the flow monitoring point to the downstream gage location (BPL) used in the relicensing studies. This move was proposed in response to comments made by ODF&W recommending that the former USGS gage site would have to be upgraded to meet current ODF&W fish passage criteria. PacifiCorp believes this

requirement is prohibitively expensive and does not meet the goal of providing a cost effective minimum flow compliance point. This location is also supported by the agency work group.

## 5. Water Quality Standards and Regulations

### 5.1 Biologically-Based Numeric Criteria

DEQ establishes numeric criteria for certain water quality parameters to provide support for biological functions of aquatic organisms. DEQ has adopted numeric criteria for temperature and dissolved oxygen (DO) which reflects life stage development of salmonid fish species.

The biologically-based numeric criteria for temperature and DO for the Wallowa River and tributaries upstream of Wallowa Lake are presented in **Table 5**. The Bull trout and Kokanee spawning use (August 15- through May 15) is based on input from ODF&W during the licensing process. The Cold Water Aquatic Life designation applies for the remainder of the year.

**Table 5: Biologically-based Numeric Criteria for Temperature and DO for the Wallowa River and tributaries upstream of Wallowa Lake.**

	<b>August 15 through May15</b>	<b>May16 through August 14</b>	<b>Rule</b>
<b>Use</b>	Bull trout/Kokanee spawning through fry emergence	Cold Water Aquatic Life	OAR 340-041-016 and Figure 151A
<b>Temperature</b>	12° C/53.6°F	12° C/53.6° F	OAR 340-041-0028
<b>Dissolved Oxygen</b>	a) Not less than 11.0 mg/l. If IGDO ≥ 8.0 mg/l, the DO spawning criterion is 9.0 mg/l; b) Where pressure, altitude or temperature preclude attainment of the 11.0 or 9.0 mg/l criteria, DO saturation must be at least 95 percent; c) Spatial median IGDO must be at least 8.0 mg/l.	Criterion is 8.0 mg/l. Where precluded by pressure, altitude or temperature, DO saturation must be at least 90 percent. At DEQ discretion, DO must not fall below 8.0 mg/l as a 30-day mean, 6.5 mg/l as a 7-day mean, and 6.0 mg/l as an absolute minimum.	OAR 340-041-0016



## 5.2 Antidegradation Policy

The purpose of Oregon's Antidegradation policy (OAR 340-041-0004) is to protect, maintain, and enhance the quality of existing surfaces. For waters which meet applicable water quality standards, the policy states that the existing water quality shall be maintained and protected unless the Oregon EQC makes certain rigorous findings of need. For water bodies which do not meet certain criteria, the policy prohibits further degradation.

The Antidegradation policy complements the use of water quality criteria. While criteria provide the absolute minimum values or conditions that must be met in order to protect designated uses, the Antidegradation policy offers protection to existing water quality, including instances where water quality meets or exceeds the criteria.

## 5.3 Water Quality Impairment in the Wallowa River

### 5.3.1 Water Quality Limited Waters

Waterbodies which fail to meet certain water quality criteria are designated as water quality limited pursuant to CWA §303(d). The EPA requires States to develop total maximum daily loads (TMDLs) for waters identified as water quality-limited. A TMDL identifies the maximum pollutant load which a water body may receive from combined point and non-point sources and still meet water quality standards necessary to support all designated beneficial uses. TMDLs quantify waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources. For hydroelectric projects located on a water quality-limited waterbody, a §401 certification may serve as the means for implementing LAs assigned to the project. Rules for developing, issuing and implementing TMDLs are in OAR Chapter 340, Division 042.

The DEQ 2010 Integrated Report presents a database of water quality limited waters in Oregon. This database indicates that no water quality limited sections of rivers are located in or near the Project boundary. However, the Lower Grande Ronde Total Maximum Daily Load for temperature which was approved by U.S. EPA in 2010, applies to all perennial and intermittent streams in the Lower Grande Ronde Basin (including the Wallowa River Subbasin). The biologically based numeric temperature criteria for the Wallowa River and its tributaries above Wallowa Lake is 12° C (53.6°F). Point sources such as the Wallowa Falls power plant and waste water treatment plants located downstream, were assigned a cumulative temperature waste load allocation (WLA) of 0.2°C. In order to meet this WLA these sources added together cannot warm the river by more than 0.2°C.

DEQ will use the §401 evaluation process to identify the Project's possible contribution to temperature and include management conditions in the §401 Certificate to address that contribution if needed. These §401 conditions may be modified as necessary if a new TMDL is approved or existing TMDL is modified.

### 5.3.2 Oregon Health Authority Listings

There are currently no fish consumption advisories for any waters in the Grande Ronde River Basin, which includes the entire project area.

## 5.4 Water Quality Standards not of Concern

Water quality standards identified in **Table 7** are not expected to be negatively affected by the operation of Project facilities. For this reason, and as further explained below, DEQ is reasonably assured that the water quality standards identified in **Table 7** below will be met during operation of the proposed Project.

**Table 7: Water Quality Standards Not Affected by Proposed Project Operations**

<b>Criterion</b>	<b>Standard</b>	<b>DEQ Evaluation</b>
Fungi OAR 340-041-007(10)	<i>The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or that are injurious to health, recreation, or industry may not be allowed.</i>	The Project does not discharge substances which promote fungal growth. The proposed modification will not alter the current flow regime in a manner which contributes to fungal growth.
Taste & Odors OAR 340-041-007(11)	<i>The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the palatability of drinking water or the palatability of fish or shellfish may not be allowed.</i>	DEQ knows of no reports of objectionable taste or odor or toxic conditions that are deleterious to fish or affect the palatability of water, fish, or shellfish. The proposed Project will not affect these characteristics.
Bottom or Sludge Deposits OAR 340-041-007(12)	<i>The formation of bottom or sludge deposits deleterious to habitat and aquatic life are not allowed.</i>	The proposed Project is not expected to generate sludge or bottom sediments.
Aesthetic conditions OAR 340-041-007(14)	<i>Aesthetic conditions offensive to human sight, taste, smell or touch may not be allowed.</i>	The proposed Project will not create aquatic conditions that are offensive to the human senses of sight, taste, smell, or touch.
Radioisotopes OAR 340-041-007(15)	<i>Radioisotope concentrations may not exceed maximum permissible concentrations in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products, or pose an external radiation hazard.</i>	The Project will not utilize, store, or produce radioactive material.
Toxic Substances OAR 340-041-0033	<i>Discharge of toxic material that affects aquatic life or human uses is not allowed.</i>	The Project may not discharge toxic material in amounts which violate toxic substances criteria.
pH OAR 340-041-0021	<i>pH values in the Powder Basin may not fall outside of the range 6.5-9.0. When greater than 25% of ambient measurements taken between June and September are greater than pH 8.7, the Department will determine whether the values higher than 8.7 are anthropogenic or natural in origin (as resources allow).</i>	The Project will not alter the current flow regime or reservoir withdrawal depth in a manner which contributes to changes in pH.
Bacteria OAR 340-041-009	<i>Limits in-water concentration of bacterial cells, discharge of raw sewage, animal waste runoff, sewer overflows, and other</i>	The Project will not discharge sewage or animal wastes into Project waters or engage in other activities which may contribute to bacterial pollution.

<i>sources of bacterial pollution.</i>		
Nuisance Algae Growth OAR 340-041-0019	<i>Algal growth which impairs the recognized beneficial uses of the water body is not allowed.</i>	The Project will not alter the scheduled release of water or create conditions favorable to algal growth.
Total Dissolved Solids OAR 340-041-0032 & OAR 340-041-0345	<i>Standard generally prohibits TDS concentrations which exceed basin-specific criterion of 100 mg/l.</i>	The Project does not contribute organic or inorganic substances in molecular, ionized, or micro-granular form which may affect TDS in Project waters.

## 5.5 Water Quality Standards of Potential Concern

Water quality standards which may potentially be impacted by proposed hydroelectric operations are evaluated in **Section 6.0**. This section provides an evaluation of potential Project effects over the range of operating conditions proposed by PacifiCorp. Based on this evaluation, DEQ determines whether proposed activities will likely comply with each water quality standard. DEQ may provide conditions on the operation of the facility, as necessary, to provide assurance that proposed operations do not violate Oregon water quality standards.

This evaluation is limited to the effects the operation of the Project under a new License may have on water quality. Project construction or other activities which necessitate in-water work may require separate water quality certifications issued by DEQ or pre-authorized pursuant to a dredge and fill permit issued by the Corps pursuant to Section 404 of the CWA.

Based on information provided by PacifiCorp coupled with a general understanding of the impact of hydroelectric operations on water quality, DEQ has identified water quality standards which may be affected by Project operations as proposed by PacifiCorp. **Table 8** identifies the water quality standards potentially impacted by the operation of the Project under a new FERC License. A detailed evaluation of the effects which Project operation may have these parameters is offered in **Section 6** of this report.

**Table 8: Water Quality Standards of Potential Concern**

<b>Criterion</b>	<b>Standard</b>	<b>DEQ Evaluation</b>
Dissolved Oxygen OAR 340-041-0016	<i>Sufficient concentrations of dissolved oxygen are necessary to support aquatic life.</i>	Passing the reservoir discharge water through the Project turbines may reduce aeration.
Total Dissolved Gas OAR 340-041-0031	<i>Protects aquatic life from gas bubble trauma caused by water that is super saturated with atmospheric gases.</i>	Project operation and discharge from tailrace may cause gas entrainment in discharge waters.
Discoloration, oily sheen, oily coatings OAR 340-041-0007(13)	<i>Objectionable discoloration, scum, oily sheen, floating solids or coating aquatic life with oil films is not allowed.</i>	Oil is used in Project turbines and transformers. Fuels may be stored onsite to operate back-up electrical generators.
Biocriteria OAR 340-041-0011	<i>Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.</i>	Passing the reservoir discharge water through the Project turbines may reduce aeration and could affect biological communities. Potential for stranding fish in tailrace during Project shut-down.

Evaluation and Findings Report

Antidegradation OAR 340-041-0004	<i>Protects existing water quality by preventing unnecessary additional water quality degradation.</i>	Must be addressed when a project is proposed that may lower existing water quality conditions, even though standard violations are not anticipated.
Temperature OAR 340-041-028	<i>Criteria is intended to minimize the risk to cold-water aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes in temperature fluctuations due to anthropogenic activities.</i>	The Project may alter the natural temperature profile of the river when portions of flow are diverted from the East Fork, passed through the project penstock and turbine, and then discharged to the West Fork.
Turbidity OAR 340-041-0036	<i>No more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity.</i>	The Project will alter the movement of sediment by retaining it in the forebay and then periodically reducing it during flushing. This action may cause temporary increases in turbidity.

## 6. Water Quality Compliance Evaluation

### 6.1 Dissolved Oxygen

#### 6.1.1 Water Quality Standard

The standard is set forth in OAR 340-041-0016:

##### Dissolved Oxygen

*Dissolved oxygen (DO): No wastes may be discharged and no activities must be conducted that either alone or in combination with other wastes or activities will cause violation of the following standards: The changes adopted by the Commission on January 11, 1996, become effective July 1, 1996. Until that time, the requirements of this rule that were in effect on January 10, 1996, apply:*

- (1) *For water bodies identified as active spawning areas in the places and times indicated on the following Tables and Figures set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, 121B, 180B, 201B and 260B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, (as well as any active spawning area used by resident trout species), the following criteria apply during the applicable spawning through fry emergence periods set forth in the tables and figures:*
  - (a) *The dissolved oxygen may not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l;*
  - (b) *Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, dissolved oxygen levels must not be less than 95 percent of saturation;*
  - (c) *The spatial median intergravel dissolved oxygen concentration must not fall below 8.0 mg/l.*
- (2) *For water bodies identified by the Department as providing cold-water aquatic life, the dissolved oxygen may not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen may not be less than 90 percent of saturation. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 8.0 mg/l as a 30- day mean minimum, 6.5 mg/l as a seven-day minimum mean, and may not fall below 6.0 mg/l as an absolute minimum (Table 21);*

The fish use map given in OAR 340, Division 041 Figure 151AA indicates water bodies in the vicinity of the site are Bull trout habitat. In addition, surveys conducted as part of this permit application have documented Bull trout spawning and rearing in the project area. The biologically-based numeric DO criteria based on these uses are summarized in **Table 9** below:

**Table 9: Biologically-Based Dissolved Oxygen Criteria**

	Cold Water Aquatic Life	Bull trout/Kokanee Spawning through fry emergence
	May 16 through August 14	August 15 through May 15
Criteria	8.0 mg/l, or 90-percent saturation if unattainable due to barometric pressure, altitude, and temperature.  OR  Per Table 21: 8.0 mg/l as a 30-day mean minimum, 6.5 mg/l as a seven-day minimum mean, 6.0 mg/l as an absolute minimum.	(a) 11.0 mg/l, or 9.0 mg/l if IGDO spatial mean is 8.0 mg/l or greater.  (b) 95-percent saturation if unattainable due to barometric pressure, altitude, and temperature.  (c) IGDO spatial median must be at least 8.0 mg/l.
Rule	OAR 340-041-0016(2)	OAR 340-041-0016(1)

### 6.1.2 Application of Water Quality Standard

Dissolved oxygen is one of the principal parameters used to determine water quality in support of aquatic life. Maintaining adequate concentrations of DO is vital to the support of fish, invertebrates, and other aquatic life. Some aquatic species such as salmonids are sensitive to reduced DO concentrations. Sensitivity also varies between various life stages (e.g., incubation, emergence, growth) and between different life processes (e.g., rearing and reproduction).

During spawning, salmonids will construct redds from suitable gravels to shelter eggs during incubation. Proper intergravel DO is critical for egg and embryo development. However, factors such as gravel porosity, substrate embeddedness, and sediment oxygen demand may reduce intergravel dissolved oxygen (IGDO) relative to DO in the water column. For this reason, DEQ establishes a biologically-based numeric criterion for IGDO to ensure adequate oxygen available to salmonids during early life stage development.

### 6.1.3 Present Conditions

Plots of continuous dissolved oxygen data from monitoring stations on the East Fork Wallowa River are presented in **Figures 13-20 (PacifiCorp, 2015)**. The data were collected during 72-hour periods in the months of August, September, and October of 2012. The stations are located above the project forebay (EFI); by-pass reach upper (BPU) located just downstream of the diversion dam; and by-pass reach lower (BPL) located in the lower portion of the East Fork Wallowa River near the confluence with the West Fork. Due to an equipment malfunction there are no data for the EFI site in August of 2012.

The DO measurements taken at the sites located in the by-pass reach of the East Fork Wallowa River downstream of the diversion dam (BPU and BPL) indicate that DO concentrations range from approximately 9.4 mg/l to approximately 12.1 mg/l during the three monitoring periods. There are some diurnal fluctuations that are the result of daily biological activity. DO concentrations are also highly dependent on temperature and barometric pressure (which is dependent on altitude). In all cases DO concentrations were above 95% saturation for the temperature and altitude of the sites.

The water column DO measurements taken at the monitoring location located in the East Fork Wallowa River above the project forebay (EFI) were consistently higher than those downstream

and above 100% saturation with a maximum value of approximately 111%. These high values are presumably due to increased aeration upstream, possibly due to higher levels of turbulent flow.

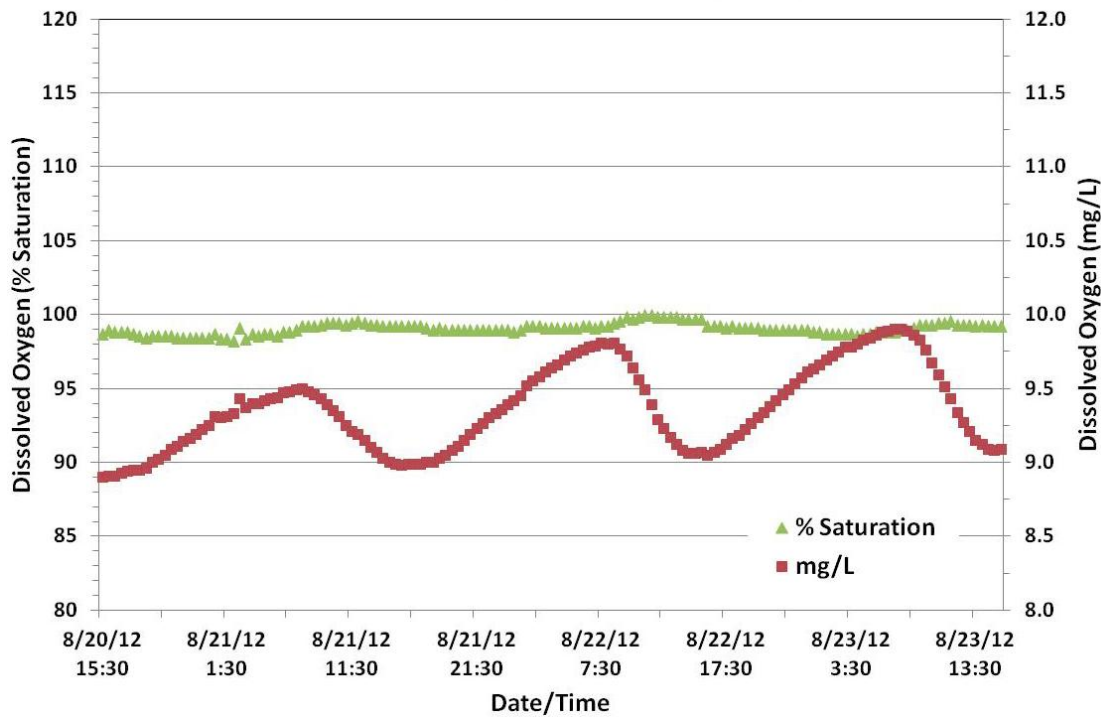


Figure 13: Dissolved oxygen concentration and percent saturation BPU site, August 2012.

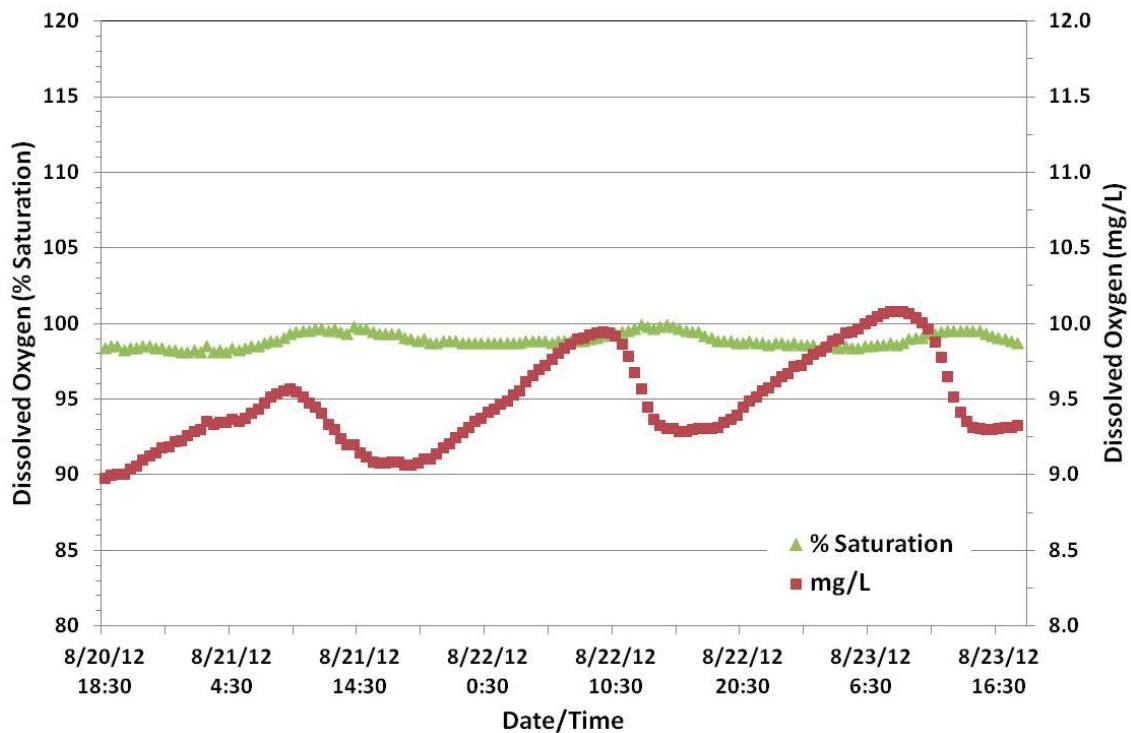
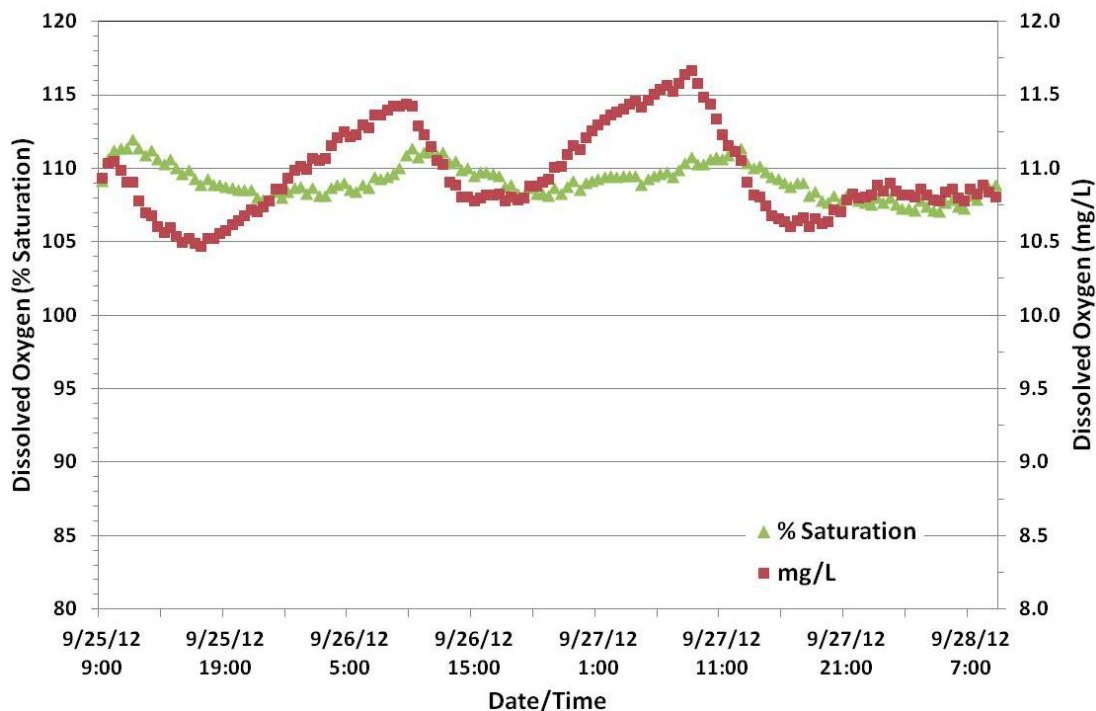
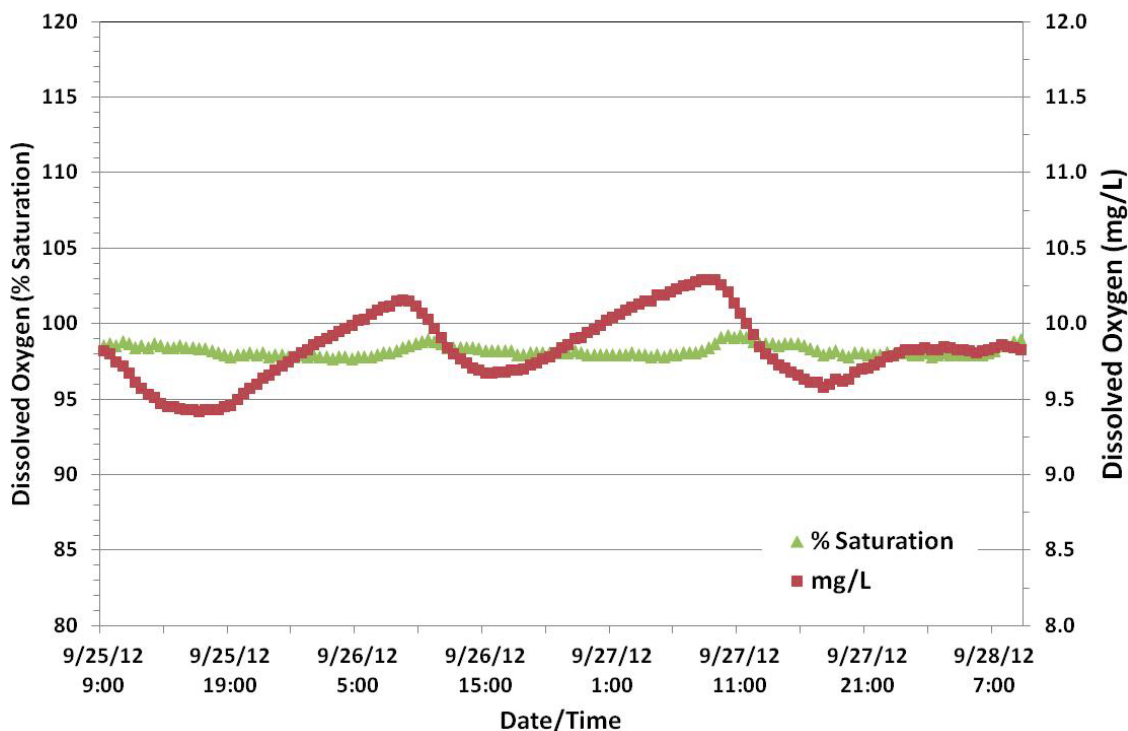


Figure 14: Dissolved oxygen concentration and percent saturation BPL site, August 2012.

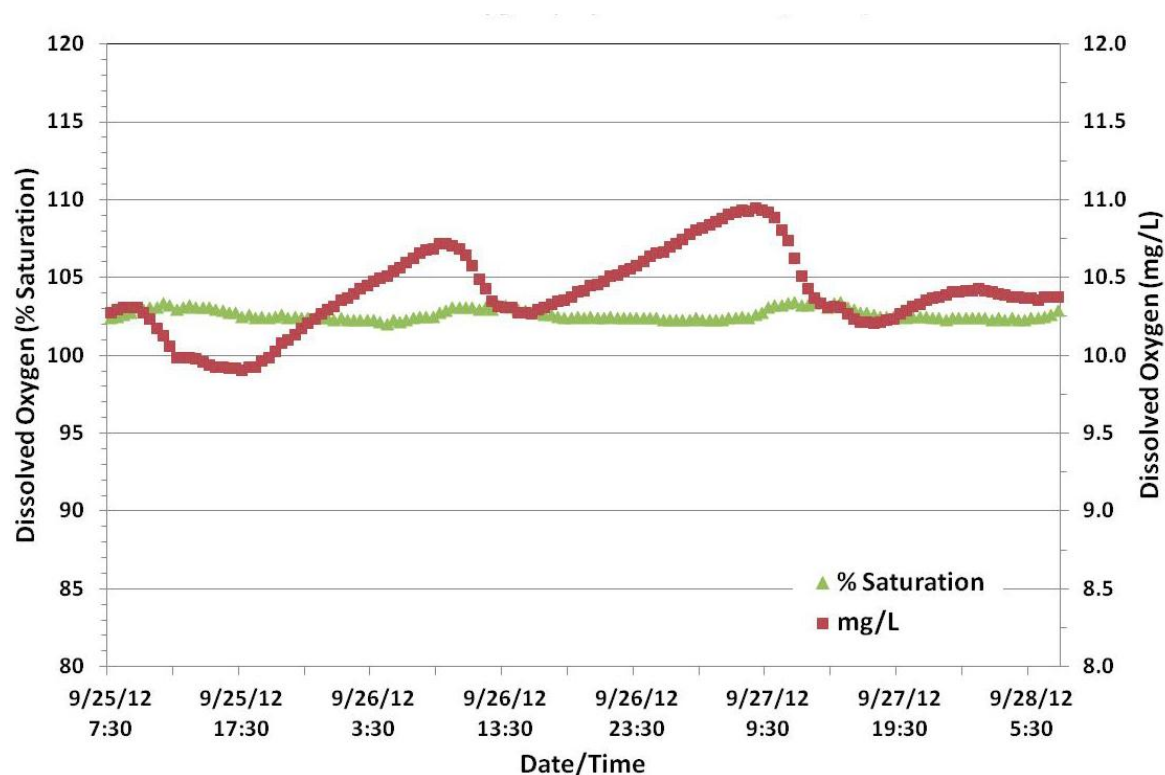


**Figure 15: Dissolved oxygen concentration and percent saturation EFI site, September 2012.**

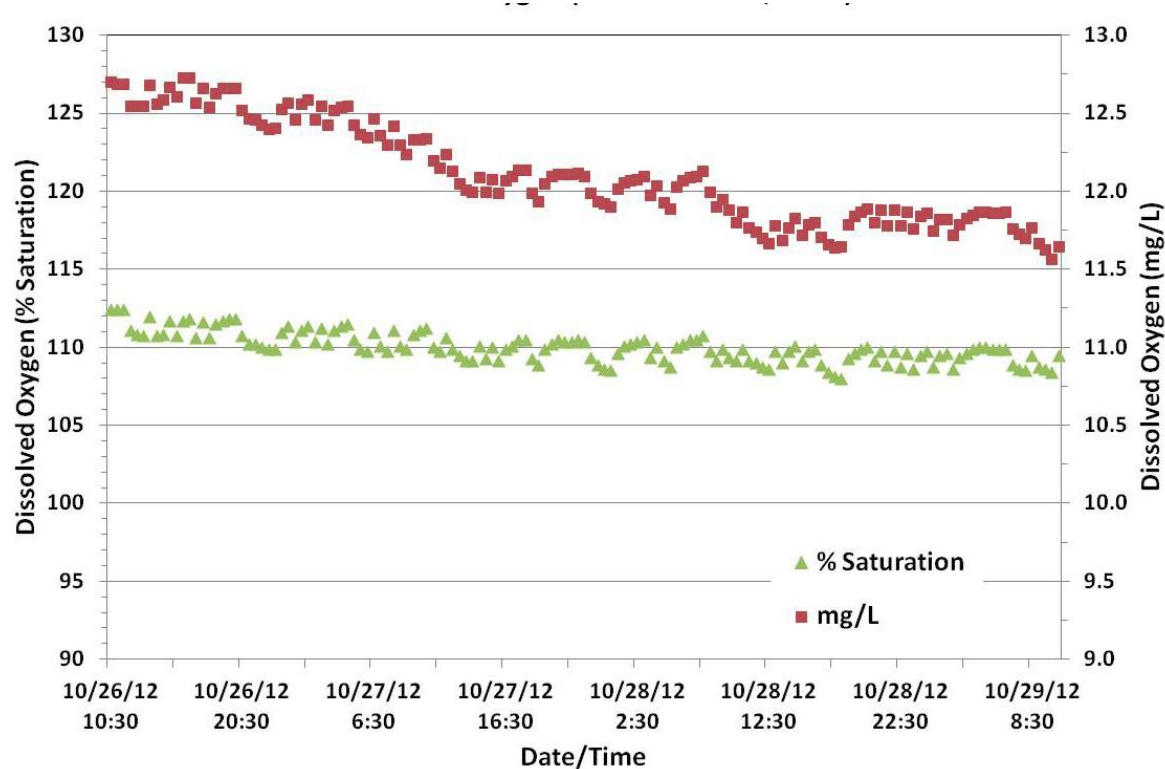


**Figure 16: Dissolved oxygen concentration and percent saturation BPU site, September 2012.**





**Figure 17: Dissolved oxygen concentration and percent saturation BPL site, September 2012.**



**Figure 18: Dissolved oxygen concentration and percent saturation EFI site, October 2012.**

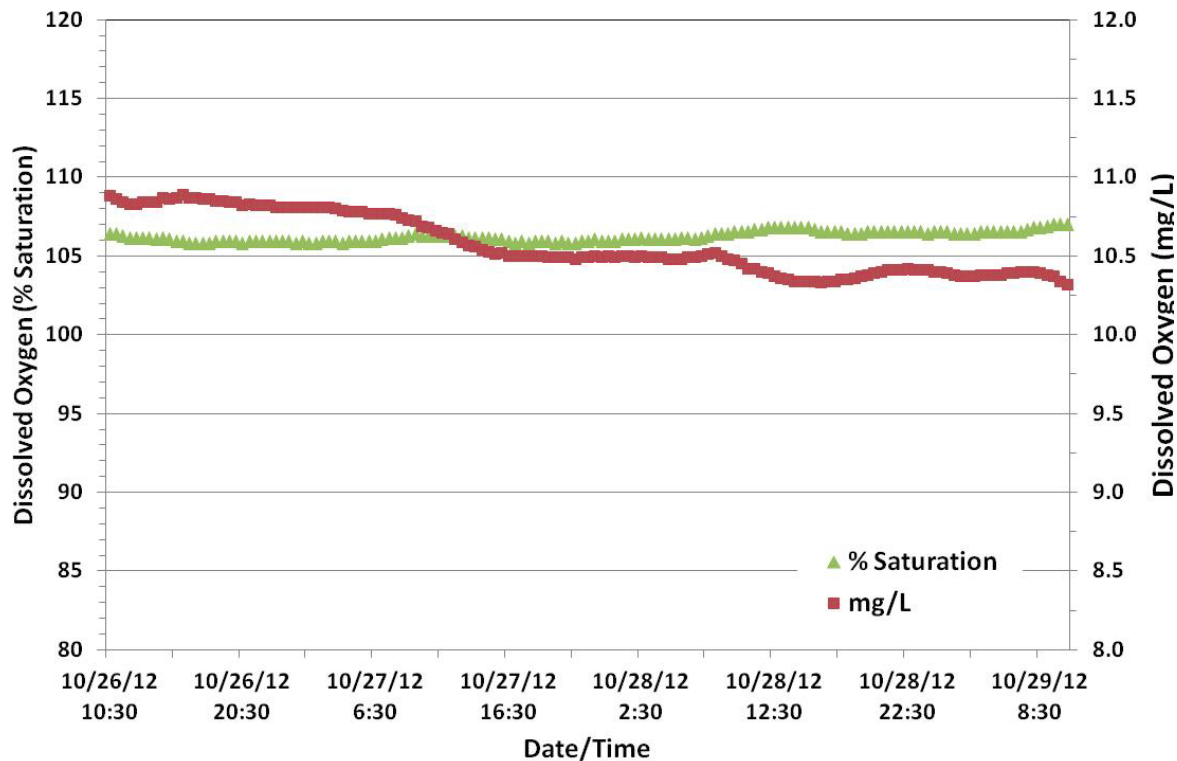


Figure 19: Dissolved oxygen concentration and percent saturation BPU site, October 2012.

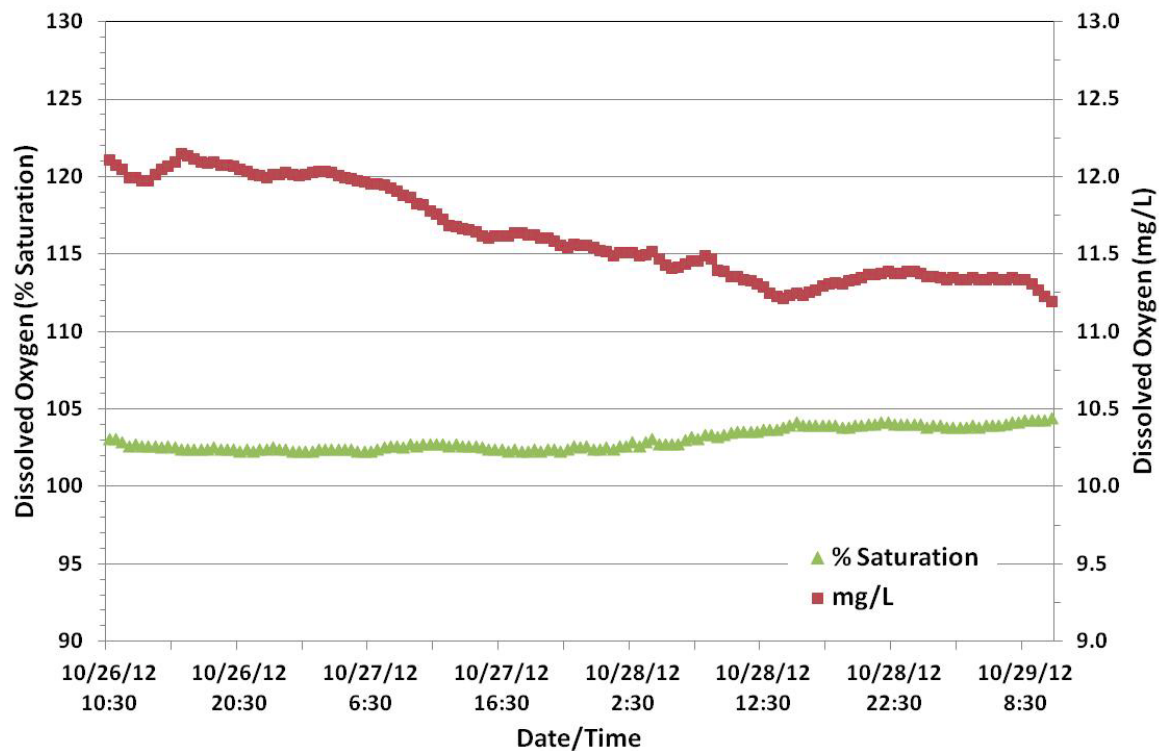


Figure 20: Dissolved oxygen concentration and percent saturation BPL site, October 2012.

### 6.1.4 Applicant's Position

PacifiCorp states that the Project does not affect DO, it complies with the DO standard, and no specific Project-related DO control or management is necessary.

### 6.1.5 DEQ Evaluation

PacifiCorp has demonstrated the Project does not affect DO in the by-passed reach of the East Fork Wallowa River. However, DO monitoring was not performed downstream of the turbine in the tailrace or in the receiving stream (West Fork Wallowa River). A new tailrace configuration is proposed that will eliminate fish use in the tailrace and change the location and configuration of the discharge point. DEQ will include a period of water column DO monitoring in the tailrace discharge as a condition of the §401 Water Quality Certification in order to assure compliance with the DO criteria at the point of discharge to the West Fork Wallowa River.

### 6.1.6 DEQ Findings

DEQ is reasonably assured that operation of the proposed Project under a new FERC License will comply with the DO standard, provided the following measures are implemented:

#### Water Quality Monitoring and Management Plan

Within 90 days of FERC License issuance, PacifiCorp shall submit a Water Quality Monitoring and Management Plan (WQMMP) to DEQ which addresses the DO monitoring and reporting requirements presented below. The WQMMP must include adaptive management strategies that will be employed if DO criteria are not met. Upon DEQ approval, the WQMMP becomes part of the § 401 Certification Conditions for the Project for the purposes of any federal license or permit.

#### DO Monitoring

PacifiCorp shall measure water column DO and temperature in the Project tailrace at a location within 25 feet of the discharge to the West Fork Wallowa River. Concurrent with DO and temperature measurements, PacifiCorp shall also record flow discharge flow from the Project. DO measurements will be made continuously at a minimum interval of one hour from August 1 to October 31 of the first project year that the new tailrace is in operation.

#### DO Reporting

PacifiCorp shall submit a report to DEQ within 90 days of completing the first season of monitoring activities. If monitoring indicates the DO water quality standard is not met, DEQ will require PacifiCorp to submit a report analyzing the situation and will require additional monitoring or adaptive management of the Project, or both, to ensure water quality standards are met below the Project. If it can be successfully demonstrated that the DO standard is being met, PacifiCorp can request to terminate DO monitoring.

## 6.2 Total Dissolved Gas

### 6.2.1 Applicable Water Quality Standard

The applicable water quality standard is set forth in 340-041-0031:

#### **Total Dissolved Gas**

*(1) Waters will be free from dissolved gases, such as carbon dioxide hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such water.*

(2) *Except when stream flow exceeds the ten-year, seven-day average flood, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 110 percent of saturation. However, in hatchery-receiving waters and other waters of less than two feet in depth, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 105 percent of saturation.*

### **6.2.2 Application of Water Quality Standard**

Releases from hydropower facilities may cause the entrainment of atmospheric gases at levels which exceed saturation. This condition may occur in turbines and/or when the momentum from a high volume discharge stream enters a receiving water body and entrains air below the water surface in the process. Under certain conditions, entrained air may dissolve into the water column at levels which exceed normal atmospheric equilibrium concentrations. Conditions which favor air entrainment include deep, non-turbulent receiving waters which provide the necessary hydrostatic pressure and quiescent conditions to form and maintain dissolved gases at supersaturated levels.

At levels above 110 percent saturation, the concentration of dissolved atmospheric gases in water may cause a variety of debilitating or lethal conditions in fish. The Total Dissolved Gas (TDG) standard is designed to prohibit discharges or activities that result in atmospheric gases reaching known harmful concentrations once dissolved in water. The use of air in turbine intakes to avoid cavitation or to increase DO levels can create supersaturation of TDG, a condition that can be avoided if identified.

### **6.2.3 Present Conditions**

Under current conditions, water is released through from the turbine to the tailrace, creating turbulent and aerated water which could possibly exceed the TGD criteria. TDG monitoring was conducted in the project tailrace during July and August of 2012. TDG measurements ranged between 96% and 100%. These values indicate that supersaturated conditions did not occur during the monitoring period and the TDG criteria was met.

### **6.2.4 Applicant's Position**

PacifiCorp has stated that the Project complies with the TDG standard. No specific Project-related action with respect to TDG control or management is necessary or proposed.

### **6.2.5 DEQ Evaluation**

The monitoring data indicate that the TDG criteria are met in the current project tailrace. However, a new tailrace and discharge structure are proposed under the revised license application. Potential impacts to TDG in the West Fork Wallowa River are unknown.

### **6.2.6 DEQ Findings**

In order to assure compliance with the TDG criteria at the new tailrace discharge, 72 hours of TDG monitoring will be required under lower flow conditions in August-September and higher flow conditions in June-July within the first year of operation. The Project WQMMP must include adaptive management strategies that will be employed if TDG criteria are not met.

Water Quality Monitoring and Management Plan

Within 90 days of FERC License issuance, PacifiCorp shall submit a Water Quality Monitoring and Management Plan (WQMMP) to DEQ which addresses the TGD monitoring and reporting requirements presented below. The WQMMP must include adaptive management strategies that will be employed if TDG criteria are not met. Upon DEQ approval, the WQMMP becomes part of the § 401 Certification Conditions for the Project for the purposes of any federal license or permit.

TGD Monitoring

PacifiCorp shall measure TGD in the Project tailrace at a location within 25 feet of the discharge to the West Fork Willowa River. Concurrent with TDG, DO and temperature measurements described previously, PacifiCorp shall also record flow discharge flow from the Project. TDG measurements will be made continuously at a minimum interval of one hour during the 72 hour monitoring periods.

TGD Reporting

PacifiCorp shall submit a report to DEQ within 90 days of completing the first season of monitoring activities. If monitoring indicates the TDG water quality standard is not met, DEQ will require PacifiCorp to submit a report analyzing the situation and will require additional monitoring or adaptive management of the Project, or both, to ensure water quality standards are met below the Project. If it can be successfully demonstrated that the TDG standard is being met, PacifiCorp can request to terminate TDG monitoring.

## 6.3 Biocriteria

### 6.3.1 Applicable Standard

The standard is given in OAR 340-041-0011:

*Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.*

### 6.3.2 Application of Standard

This narrative criterion recognizes that compliance with individual criteria may not fully capture synergistic effects resulting from multiple stressors and cumulative impacts on aquatic species and resident biological communities. The biocriteria standard complements parameter-specific standards by extending broad protections to all designated beneficial uses with the implicit assumption that if the most sensitive beneficial use is protected, then all uses will be protected. Application of the biological criteria standard is intended to assess the overall impact to the aquatic community from water quality changes attributable to an anthropogenic activity. In practice, the biological criteria standard uses biomonitoring techniques to assess biological health, integrity, and complexity of resident biological communities within the Project area relative to comparable reference locations.

Definitions applicable to the biocriteria standard include (OAR 340-041-0002):

(5) "Appropriate Reference Site or Region" means a site on the same waterbody, or within the same basin or ecoregion that has similar habitat conditions, and represents the water quality and biological community attainable within the areas of concern.

(6) "Aquatic Species" means plants or animals that live at least part of their life cycle in waters of the state.

(17) "Designated Beneficial Use" means the purpose or benefit to be derived from a water body, as designated by the Water Resources Department or the Water Resources Commission.

(19) "Ecological Integrity" means the summation of chemical, physical and biological integrity capable of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region.

(50) "Resident Biological Community" means aquatic life expected to exist in a particular habitat when water quality standards for a specific ecoregion, basin, or water body are met. This must be established by accepted biomonitoring techniques.

(75) "Without Detrimental Changes in the Resident Biological Community" means no loss of ecological integrity when compared to natural conditions at an appropriate reference site or region.

### 6.3.3 Present Conditions

The Project has a small reservoir impounded by a rock-crib dam structure in the East Fork Wallowa River. This dam is located above a natural waterfall that serves as a barrier to migrating fish such as Bull trout and Kokanee. The presence of these sensitive fish species below the project diversion dam suggests that the ecological impacts are moderate. The biggest impact to fisheries appears to be the reduction in flow and loss of physical stream habitat in the by-pass reach of the East Fork (**PacifiCorp, 2013**). Fish can also become stranded in the tailrace during Project shut-down events.

Benthic invertebrate surveys in the by-passed reach indicate the presence of a diverse group of aquatic insects, many of which are adapted to high quality cold water environments. These data are presented in Section 3.4.3.

Water quality monitoring conducted during the Project re-licensing effort also support the conclusion that the aquatic habitats in the project area are of good quality. Dissolved oxygen concentrations consistently met the stringent criteria for bull trout and other salmonid spawning and rearing, and stream temperatures were only slightly above the Bull trout spawning and juvenile rearing criteria in July and August. Temperature data measured in the by-pass reach are presented in Section 6.6.

### **6.3.4 Applicant's Position**

PacifiCorp maintains the Project complies with the biocriteria standard and other narrative water quality criteria. PacifiCorp has also included improvements to minimum flow in the by-passed reach that are believed to improve aquatic habitat quality and quantity, and has committed to the installation of a fish passage barrier in the tailrace to prevent fish from entering the tailrace and being stranded during shut-down events.

PacifiCorp has also committed to conduct bull trout spawning and population surveys and conduct genetic testing of fish to determine the level of brook trout introgression in the bull trout population.

### **6.3.5 DEQ Evaluation**

The biocriteria standard extends broad protections to all beneficial uses. This standard complements other criteria-specific water quality standards while examining cumulative impacts from multiple stressors associated with Project developments and operations.

DEQ has worked with PacifiCorp as part of the agency stakeholder group to modify current project operations to improve aquatic habitat while providing for project operation. DEQ has determined that the improvements to minimum flows in the by-passed reach will assure project compliance with the biocriteria standard. Water quality monitoring of the tailrace discharge for DO and TDG will also assure compliance with the biocriteria standard in the West Fork Wallowa River. The prevention of fish stranding in the tailrace and gathering of bull trout population and genetics information will be beneficial to protection this sensitive beneficial use.

### **6.3.6 DEQ Findings**

DEQ is reasonably assured that operation of the Project under the new conditions proposed in the application for a renewed FERC License will comply with the Biological Criteria water quality standard provided the following measures are implemented:

- Compliance with the minimum flow and other conditions contained in the DEQ §401 Water Quality Certification.
- Within 90 days of FERC License issuance, shall submit a revised WQMMP to DEQ which addresses the DO monitoring and reporting requirements presented previously. Upon DEQ approval, the WQMMP becomes part of the § 401 Certification Conditions for the Project for the purposes of any federal license or permit.

- Construct and maintain the fish passage barrier in the Project tailrace and conduct bull trout population and genetic studies contained in the DEQ §401 Water Quality Certification.

## 6.4 Discoloration, Oily Sheen, Oily Coatings

### 6.3.1 Applicable Standard

The standard is given in OAR 340-041-0007(13):

*Objectionable discoloration, scum, oily sheens, or floating solids, or coating of aquatic life with oil films may not be allowed.*

### 6.4.2 Application of Standard

This narrative standard extends protections to surface waters against conditions which humans may reasonably find objectionable or which be harmful or deleterious to aquatic life.

### 6.4.3 Present Conditions

DEQ knows of no reports of objectionable discoloration, scum, oily sheens, or floating solids in waters associated with the proposed Project. PacifiCorp maintains that current spill prevention and response plans will be sufficient to help avoid spills of oil or hazardous materials and provide a rapid response to any spills that do occur.

### 6.4.4 Applicant Position

Hydroelectric projects require certain oil and chemical liquids for operation and maintenance. To manage materials stored at the facility, PacifiCorp developed an oil Spill Prevention, Control and Countermeasure Plan (SPCC, **PacifiCorp, 2014**). The objective of the SPCC Plan is to provide guidance on the storage and use of chemicals stored onsite, and prescribe emergency response procedures to be followed in the event of a release.

The SPCC Plan indicates that approximately five 55-gallon drums of petroleum-based liquids will be maintained within the powerhouse in an area designated for hazardous material storage. Containers are located in an area with secondary containment to contain incidental spillage. Three transformers with oil capacities of 400 gallons each are located in the switchyard. The switchyard has a berm to provide containment of spills. A supply of petroleum absorbent material will be maintained nearby for use in the event of a spill. The Plan further describes spill containment, cleanup, and reporting procedures to be implemented in the event of a chemical spill.

PacifiCorp believes the spill prevention and response procedures contained in SPCC Plan are adequate to safeguard aquatic resources from adverse consequences related to spills of hazardous materials.

### 6.4.5 DEQ Evaluation

The use of greases and lubricants and transformer oil is necessary to maintain proper equipment function and operation. Appropriate management of hazardous materials stored onsite is addressed in the SPCC Plan.



The greatest risk to aquatic resources is from the accidental release of liquid petroleum products used or stored adjacent to open waterways. The remote location of the Project relative to first responders underscores the need to maintain employee training and awareness programs and adequate stores of spill response equipment necessary to contain and control releases of hazardous materials.

#### **6.4.6 DEQ Findings**

DEQ is reasonably assured Project operation under a new FERC License will not violate the State narrative criteria for objectionable discoloration, scum, and oily sheens provided the following measures are implemented:

##### Spill Prevention, Control and Countermeasure Plan

PacifiCorp must implement the spill prevention and response measures as presented in the SPCC plan. PacifiCorp must periodically update that plan as warranted to reflect changes in Project operation, use of materials, or strategic change in response procedures.

##### Best Management Practices

During use of materials which may, if spilled, result in adverse or objectionable conditions in violation of this water quality standard, PacifiCorp must employ Best Management Practices appropriate to the task being performed. All materials must be used in a manner and for a purpose which reflects their intended application. PacifiCorp may consult the manufacturer for guidance related to appropriate application methodology, recommended cleanup procedures, appropriate storage, and acceptable disposal protocols.

##### Notification

In the event of a spill or release or threatened spill or release to waters of the state of petroleum or other hazardous substances at or above reportable quantities as specified in applicable state and federal regulations, PacifiCorp must implement the spill response procedures in the SPCC Plan, notify the Oregon Emergency Response System (OERS), and comply with ORS Chapters 466 and 468, as applicable.

##### Recordkeeping

For the term of the new FERC License, PacifiCorp shall retain records for the period of time required by law which document: modifications to the SPCC Plan; reportable releases; visual observations and photographic documentation of hazardous material releases which impact aquatic resources; remedial activities undertaken by PacifiCorp or a designated contractor to address hazardous material releases; correspondence and conversation records which document agency notification, as warranted regarding hazardous material releases; other records as deemed appropriate.

## 6.5 Antidegradation

Water quality standards have three main elements; the beneficial uses that are protected by the standard, numeric and narrative criteria which support these uses and an Antidegradation policy that governs how and when existing water quality may be lowered. When DEQ considers issuing a permit or a water quality certificate that would allow the existing water quality to be diminished in some way, the DEQ action must comply with the Antidegradation provisions of the water quality standards.

EPA rules adopted pursuant to Section 303 of the federal Clean Water Act require state water quality standards to contain a statewide Antidegradation policy. This policy must provide that existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

### 6.5.1 Water Quality Standard

The applicable standard is set forth in 340-041-0004, with only applicable sections summarized below:

#### Antidegradation

- (1) Purpose. The purpose of the Antidegradation Policy is to guide decisions that affect water quality such that unnecessary further degradation from new or increased point and nonpoint sources of pollution is prevented, and to protect, maintain, and enhance existing surface water quality to ensure the full protection of all existing beneficial uses. The standards and policies set forth in OAR 340-041-0007 through 340-041-0350 are intended to supplement the Antidegradation Policy.*
- (2) Growth Policy, is not applicable*
- (3) Nondegradation Discharges. The following new or increased discharges are subject to this Division. However, because they are not considered degradation of water quality, they are not required to undergo an Antidegradation review under this rule:  
((a-b), not applicable)  
(c) Temperature. Insignificant temperature increases authorized under OAR 340-041-0028(11) and (12) are not considered a reduction in water quality.  
(d) Dissolved Oxygen. Up to a 0.1 mg/l decrease in dissolved oxygen from the upstream end of a stream reach to the downstream end of the reach is not considered a reduction in water quality so long as it has no adverse effects on threatened and endangered species.*
- (4) Recurring Activities. Since the baseline for applying the Antidegradation policy to an individual source is the water quality resulting from the source's currently authorized discharge, and since regularly-scheduled, recurring activities remain subject to water quality standards and the terms and conditions in any applicable federal and state permits, certifications and licenses, the following activities will not be considered new or increasing discharges and will therefore not trigger an antidegradation review under this rule so long as they do not increase in frequency, intensity, duration or geographical extent:  
(a) Rotating grazing pastures  
(b) Agricultural crop rotations, and  
(c) Maintenance dredging.*
- (5) Exemptions to the Antidegradation Requirement. Some activities may, on a short term basis, cause temporary water quality degradation. However, these same activities may also have substantial and desirable environmental benefits. The following activities and situations fall into this category. Such activities and situations remain subject to water quality standards,*

- and must demonstrate that they have minimized adverse effects to threatened and endangered species in order to be exempt from the antidegradation review under this rule:*
- (a) *Riparian Restoration Activities. Activities that are intended to restore the geomorphology or riparian vegetation of a water body, or control invasive species need not undergo an antidegradation review as long as the Department (DEQ) determines that there is a net ecological benefit to the restoration activity. Reasonable measures that are consistent with the restoration objectives for the water body must be used to minimize the degradation.*
  - (b) *Emergency Situations. The Director (of DEQ) or a designee may, for a period of time no greater than 6 months, allow lower water quality without an antidegradation review under this rule in order to respond to public health and welfare emergencies (for example, a significant threat of loss of life, personal injury or severe property damage);*
  - (6) *High Quality Waters Policy: Where the existing water quality meets or exceeds those levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, and other designated beneficial uses, that level of water quality must be maintained and protected. However, the Environmental Quality Commission, after full satisfaction of the intergovernmental coordination and public participation provisions of the continuing planning process, and with full consideration of sections (2) and (9) of this rule, and OAR 340-041-0007(4), may allow a lowering of water quality in these high quality waters if it finds:*
    - (a) *No other reasonable alternatives exist except to lower water quality; and*
    - (b) *The action is necessary and benefits of the lowered water quality outweigh the environmental costs of the reduced water quality. This evaluation will be conducted in accordance with DEQ's "Antidegradation Policy Implementation Directive for NDDES Permits and section 401 water quality certifications," pages 27, and 33-39 (March 201) incorporated herein by reference;*
    - (c) *All water quality standards will be met and beneficial uses protected; and*
    - (d) *Federal threatened and endangered aquatic species will not be adversely affected.*
  - (7) *Water Quality Limited Waters Policy: Water quality limited waters may not be further degraded except in accordance with section (9)(a)(B), (C) and (D) of this rule.*
  - (8) *Outstanding Resources Waters Policy, is not applicable*
  - (9) *Exceptions. The Commission or Department may grant exceptions to this rule so long as the following procedures are met:*
    - (a) *In allowing new or increased discharged loads, the Commission or Department must make the following findings:*
      - (A) *The new or increased discharged load will not cause water quality standards to be violated;*
      - (B) *The action is necessary and benefits of the lowered water quality outweigh the environmental costs of the reduced water quality. This evaluation will be conducted in accordance with DEQ's "Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and section 401 water quality certifications," pages 27, and 33-39 (March 2001) incorporated herein by reference; and*
      - (C) *The new or increased discharged load will not unacceptably threaten or impair any recognized beneficial uses or adversely affect threatened or endangered species. In making this determination, the Commission or Department may rely upon the presumption that if the numeric criteria established to protect specific uses are met the beneficial uses they were designed to protect are protected. In making this determination the Commission or Department may also evaluate other State and federal agency data that would provide information on potential impacts to beneficial uses for which the numeric criteria have not been set;*

- (D) *The new or increased discharged load may not be granted if the receiving stream is classified as being water quality limited under OAR 340-041-0002(62)(a), unless:*
- (i) *The pollutant parameters associated with the proposed discharge are unrelated either directly or indirectly to the parameter(s) causing the receiving stream to violate water quality standards and being designated water quality limited; or*
  - (ii) *Total maximum daily loads (TMDLs), waste load allocations (WLAs) load allocations (LAs), and the reserve capacity have been established for the water quality limited receiving stream; and compliance plans under which enforcement action can be taken have been established; and there will be sufficient reserve capacity to assimilate the increased load under the established TMDL at the time of discharge; or*
  - (iii) *Effective July 1, 1996, in water bodies designated water-quality limited for dissolved oxygen, when establishing WLAs under a TMDL for water bodies meeting the conditions defined in this rule, the Department may at its discretion provide an allowance for WLAs calculated to result in no measurable reduction of dissolved oxygen (DO). For this purpose, "no measurable reduction" is defined as no more than 0.10 mg/L for a single source and no more than 0.20 mg/L for all anthropogenic activities that influence the water quality limited segment. The allowance applies for surface water DO criteria and for Intergravel dissolved oxygen (IGDO) if a determination is made that the conditions are natural. The allowance for WLAs applies only to surface water 30-day and seven-day means; or*
  - (iv) *Under extraordinary circumstances to solve an existing, immediate and critical environmental problem, the Commission or Department may, after the completion of a TMDL but before the water body has achieved compliance with standards, consider a waste load increase for an existing source on a receiving stream designated water quality limited under subsection (a) of the definition of "Water Quality Limited" in OAR 340-041-0002. This action must be based on the following conditions:*
    - (I) *That TMDLs, WLAs and LAs have been set; and*
    - (II) *That a compliance plan under which enforcement actions can be taken has been established and is being implemented on schedule; and*
    - (III) *That an evaluation of the requested increased load shows that this increment of load will not have an unacceptable temporary or permanent adverse effect on beneficial uses or adversely affect threatened or endangered species; and*
    - (IV) *That any waste load increase granted under subparagraph (iv) of this paragraph is temporary and does not extend beyond the TMDL compliance deadline established for the water body. If this action will result in a permanent load increase, the action has to comply with subparagraphs (i) or (ii) of this paragraph.*
- (b) *The activity, expansion, or growth necessitating a new or increased discharge load is consistent with the acknowledged local land use plans as evidenced by a statement of land use compatibility from the appropriate local planning agency.*
- (c) *Oregon's water quality management policies and programs recognize that Oregon's water bodies have a finite capacity to assimilate waste. Unused assimilative capacity is an exceedingly valuable resource that enhances in-stream values and environmental quality in general. Allocation of any unused assimilative capacity should be based on*

*explicit criteria. In addition to the conditions in subsection (a) of this section, the Commission or Department may consider the following:*

*(A) Environmental Effects Criteria:*

- (i) Adverse Out-of-Stream Effects. There may be instances where the non-discharge or limited discharge alternatives may cause greater adverse environmental effects than the increased discharge alternative. An example may be the potential degradation of groundwater from land application of wastes;*
- (ii) Instream Effects. Total stream loading may be reduced through elimination or reduction of other source discharges or through a reduction in seasonal discharge. A source that replaces other sources, accepts additional waste from less efficient treatment units or systems, or reduces discharge loadings during periods of low stream flow may be permitted an increased discharge load year-round or during seasons of high flow, so long as the loading has no adverse effect on threatened and endangered species;*
- (iii) Beneficial Effects. Land application, upland wetlands application, or other non-discharge alternatives for appropriately treated wastewater may replenish groundwater levels and increase stream flow and assimilative capacity during otherwise low stream flow periods.*

*(B) Economic Effects Criteria. When assimilative capacity exists in a stream, and when it is judged that increased loadings will not have significantly greater adverse environmental effects than other alternatives to increased discharge, the economic effect of increased loading will be considered. Economic effects will be of two general types:*

- (i) Value of Assimilative Capacity. The assimilative capacity of Oregon's streams is finite, but the potential uses of this capacity are virtually unlimited. Thus it is important that priority be given to those beneficial uses that promise the greatest return (beneficial use) relative to the unused assimilative capacity that might be utilized. In-stream uses that will benefit from reserve assimilative capacity, as well as potential future beneficial use, will be weighed against the economic benefit associated with increased loading;*
- (ii) Cost of Treatment Technology. The cost of improved treatment technology, non-discharge and limited discharge alternatives may be evaluated.*

### **6.5.2 Application of Standard**

The Antidegradation Policy describes the intent and focus of the EQC in applying water quality standards to new or modified sources and anthropogenic activities that may adversely affect water quality or beneficial uses. The policy outlines a review process to be completed before DEQ may assign additional assimilative capacity in Oregon waters to a new or modified source of pollution.

In applying the Antidegradation Policy to this §401 Application, DEQ evaluates the operating conditions of the Project under a new License to determine whether there is reasonable assurance that no degradation of existing water quality will occur unless the identified degradation complies with the Antidegradation Policy.

Generally, compliance with the water quality standards in OAR 340-041 would be considered sufficient to assure that beneficial uses will be protected. However, if a standard has not been adopted for a pollutant, or if new information indicates that an existing standard does not

adequately support a given beneficial use, DEQ is required to revise the water quality standard to protect the recognized beneficial use.

### **6.5.3 Present Conditions**

Existing water quality conditions are described in this Evaluation and Findings Report, application for federal license, and the §401 Application.

### **6.5.4 Applicant's Position**

PacifiCorp believes operation of the Project will comply with Oregon water quality standards and other relevant provisions of state law, and proposed changes in operation will not improve support for designated beneficial uses. Some proposed enhancements, such as the tailrace realignment, may cause short-term degradation associated with construction activities. However, temporary degradation from enhancement actions is not subject to the Antidegradation standard. PacifiCorp believes that the project complies with Oregon's Antidegradation Policy.

### **6.5.5 DEQ Evaluation**

The Project will operate as a run-of-reservoir facility using releases for hydropower generation. The project discharge does not lower water quality, meets all applicable water quality criteria, and supports sensitive beneficial uses. Proposed modifications to the project will enhance the support of the beneficial uses of the Willowa River. DEQ has determined the project meets the Antidegradation policy and will require additional water quality monitoring to assure future compliance.

This Antidegradation evaluation is limited to potential water quality impacts resulting from operations under a renewed FERC License for the Mason Dam Hydroelectric Project. Subsequent Antidegradation reviews may be required to process separate water quality actions such as §401 water quality certificates issued in conjunction with §404 of the CWA for in-water construction or maintenance projects.

## **6.6 Temperature**

### **6.6.1 Applicable Standard**

The applicable standard is given in 340-041-0028:

#### **Temperature**

*(1) Background. Water temperatures affect the biological cycles of aquatic species and are a critical factor in maintaining and restoring healthy salmonid populations throughout the State. Water temperatures are influenced by solar radiation, stream shade, ambient air temperatures, channel morphology, groundwater inflows, and stream velocity, volume, and flow. Surface water temperatures may also be warmed by anthropogenic activities such as discharging heated water, changing stream width or depth, reducing stream shading, and water withdrawals.*

*(2) Policy. It is the policy of the Commission to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. The Commission intends to minimize the risk to coldwater aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes in temperature fluctuations due to anthropogenic activities. The Commission recognizes that some of the State's waters will, in their natural condition, not provide optimal thermal conditions at all places and at all times that salmonid use occurs. Therefore, it is especially important to minimize additional warming due to anthropogenic sources. In addition, the Commission*

*acknowledges that control technologies, best management practices and other measures to reduce anthropogenic warming are evolving and that the implementation to meet these criteria will be an iterative process. Finally, the Commission notes that it will reconsider beneficial use designations in the event that man-made obstructions or barriers to anadromous fish passage are removed and may justify a change to the beneficial use for that water body.*

*(3) Purpose. The purpose of the temperature criteria in this rule is to protect designated temperature sensitive beneficial uses, including specific salmonid life cycle stages in waters of the State.*

*(4) Biologically Based Numeric Criteria. Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:*

*(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;*

*(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to OAR 340-041-340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);*

*(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to OAR 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);*

*(d) The seven-day-average maximum temperature of a stream identified as having a migration corridor use on subbasin maps and tables OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 151A, 170A, and 340A, may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit). In addition, these waterbodies must have coldwater refugia that are sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body.*

*e) The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 121B, 140B, 190B, and 250B, and Figures 180A, 201A, 260A and 310A may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit);*

*(f) The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130B, 151B, 160B, 170B, 180A, 201A, 260A, 310B, and 340B, may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit). From August 15 through May 15, in bull trout spawning waters below Clear Creek and Mehlhorn reservoirs on Upper Clear Creek (Pine Subbasin), below Laurance Lake on the Middle Fork Hood River, and below Carmen reservoir on the Upper McKenzie River, there may be no more than a 0.3 degrees Celsius (0.5 Fahrenheit) increase between the water temperature immediately upstream of the reservoir and the water temperature immediately downstream of the spillway when the ambient seven-day-average maximum stream temperature is 9.0 degrees Celsius (48 degrees Fahrenheit) or greater, and no more than a 1.0 degree Celsius (1.8 degrees Fahrenheit) increase when the seven-day-average stream temperature is less than 9 degrees Celsius.*

*(12) Implementation of the Temperature Criteria.*

*(a) Minimum Duties. There is no duty for anthropogenic sources to reduce heating of the waters of the State below their natural condition. Similarly, each anthropogenic point and nonpoint source is responsible only for controlling the thermal effects of its own discharge or activity in accordance with its overall heat contribution. In no case may a source cause more warming than that allowed by the human use allowance provided in subsection (b) of this rule.*

*(b) Human Use Allowance. Insignificant additions of heat are authorized in waters that exceed the applicable temperature criteria as follows: (B) Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.*

*(h) Other Nonpoint Sources. The department may, on a case-by-case basis, require nonpoint sources (other than forestry and agriculture), including private hydropower facilities regulated by a 401 water quality certification, that may contribute to warming of State waters beyond 0.3 degrees Celsius (0.5 degrees Fahrenheit), and are therefore designated as water-quality limited, to develop and implement a temperature management plan to achieve compliance with applicable temperature criteria or an applicable load allocation in a TMDL pursuant to OAR 340-042-0080. (A) Each plan must ensure that the nonpoint source controls its heat load contribution to water temperatures such that the water body experiences no more than a 0.3 degrees Celsius (0.5 degree Fahrenheit) increase above the applicable criteria from all sources taken together at the maximum point of impact. (B) Each plan must include a description of best management practices, measures, effluent trading, and control technologies (including eliminating the heat impact on the stream) that the nonpoint source intends to use to reduce its temperature effect, a monitoring plan, and a compliance schedule for undertaking each measure. (C) The Department may periodically require a nonpoint source to revise its temperature management plan to ensure that all practical steps have been taken to mitigate or eliminate the temperature effect of the source on the water body. (D) Once approved, a nonpoint source complying with its temperature management plan is deemed in compliance with this rule.*

*(i) Compliance Methods. Anthropogenic sources may engage in thermal water quality trading in whole or in part to offset its temperature discharge, so long as the trade results in at least a net thermal loading decrease in anthropogenic warming of the water body, and does not adversely affect a threatened or endangered species. Sources may also achieve compliance, in whole or in part, by flow augmentation, hyporheic exchange flows, outfall relocation, or other measures that reduce the temperature increase caused by the discharge.*

*(j) Release of Stored Water. Stored cold water may be released from reservoirs to cool downstream waters in order to achieve compliance with the applicable numeric criteria. However, there can be no significant adverse impact to downstream designated beneficial uses as a result of the releases of this cold water, and the release may not contribute to violations of other water quality criteria. Where the Department determines that the release of cold water is resulting in a significant adverse impact, the Department may require the elimination or mitigation of the adverse impact.*



## 6.6.2 Application of Standard

The temperature standard protects waters of the state against anthropogenic thermal loading which may impair water quality or undermine support for designated beneficial uses. Water temperatures that are acutely or chronically above biologically based levels can harm aquatic organisms that depend upon cold water to live or reproduce. This is particularly true of Oregon's native "cold-water" fish such as salmon, bull trout, rainbow trout, cutthroat trout, steelhead trout and certain amphibians including frogs and salamanders. Elevated water temperature may produce negative physiological effects including decreased spawning success, impaired feeding and growth, reduced resistance to disease and parasites, increased sensitivity to toxic substances, diminished migration tendencies, reduced ability to compete with more temperature-resistant species, and increased vulnerability to predation. If water temperatures are high enough for sustained periods, mortality occurs.

Elevated temperatures may also adversely affect other important water quality parameters including DO, and increased algae and fungi productivity. DEQ adopts biologically based numeric temperature criteria to support specific life stage and development activities of species which may currently occupy or have historically occupied certain ranges. Native salmonids including bull trout, rainbow trout, and whitefish are present in the Willowa River and its east and west forks. Biologically based numeric temperature criteria applicable to the Project are determined by the Fish Use and Spawning Map presented as Figures 151A of OAR 340, Division 041. Figure 151A designates the entire Project area as bull trout spawning and rearing habitat which has a seven-day-average maximum temperature criterion of 12.0°C. The temperature criterion is based on a calculation of the seven-day average maximum (7DMX) temperature. The 7DMX metric is the average of the daily maximum temperatures from seven consecutive days made on a rolling basis.

Definitions applicable to the temperature standard include:

### 340-041-0002 Definitions

Definitions applicable to all basins unless context requires otherwise:

- (2) "Ambient Stream Temperature" means the stream temperature measured at a specific time and place. The selected location for measuring stream temperature must be representative of the stream in the vicinity of the point being measured.
- (3) "Anthropogenic," when used to describe "sources" or "warming," means that which results from human activity;
- (4) "Applicable Criteria" means the biologically based temperature criteria in OAR 340-041-0028(4), the superseding cold water protection criteria in OAR 340-041-0028(11), or the superseding natural condition criteria as described in OAR 340-041-0028(8). The applicable criteria may also be site-specific criteria approved by U.S. EPA. A subbasin may have a combination of applicable temperature criteria derived from some or all of these numeric and narrative criteria.
- (9) "Cold-Water Aquatic Life" means aquatic organisms that are physiologically restricted to cold water, including but not limited to native salmon, steelhead, mountain whitefish, char (including bull trout), and trout.
- (10) "Cold Water Refugia" means those portions of a water body where or times during the diel temperature cycle when the water temperature is at least 2 degrees Celsius colder than the daily maximum temperature of the adjacent well-mixed flow of the water body.
- (13) "Core Cold-Water Habitat Use" means waters that are expected to maintain temperatures within the range generally considered optimal for salmon and steelhead rearing, or that are suitable for bull trout migration, foraging, and sub-adult rearing that occurs during the summer.

These uses are designated on the following subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 180A, 201A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A.

(20) "Epilimnion" means the seasonally stratified layer of a lake or reservoir above the metalimnion; the surface layer.

(24) "Hypolimnion" means the seasonally stratified layer of a lake or reservoir below the metalimnion; the bottom layer.

(30) "Load Allocation (LA)" means the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading that may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Whenever possible, natural and nonpoint source loads should be distinguished.

(36) "Metalimnion" means the seasonal, thermally stratified layer of a lake or reservoir that is characterized by a rapid change in temperature with depth and that effectively isolates the waters of the epilimnion from those of the hypolimnion during the period of stratification; the middle layer.

(40) "Natural Conditions" means conditions or circumstances affecting the physical, chemical, or biological integrity of a water of the state that are not influenced by past or present anthropogenic activities. Disturbances from wildfire, floods, earthquakes, volcanic or geothermal activity, wind, insect infestation, and diseased vegetation are considered natural conditions.

(41) "Natural Thermal Potential" means the determination of the thermal profile of a water body using best available methods of analysis and the best available information on the site-potential riparian vegetation, stream geomorphology, stream flows, and other measures to reflect natural conditions.

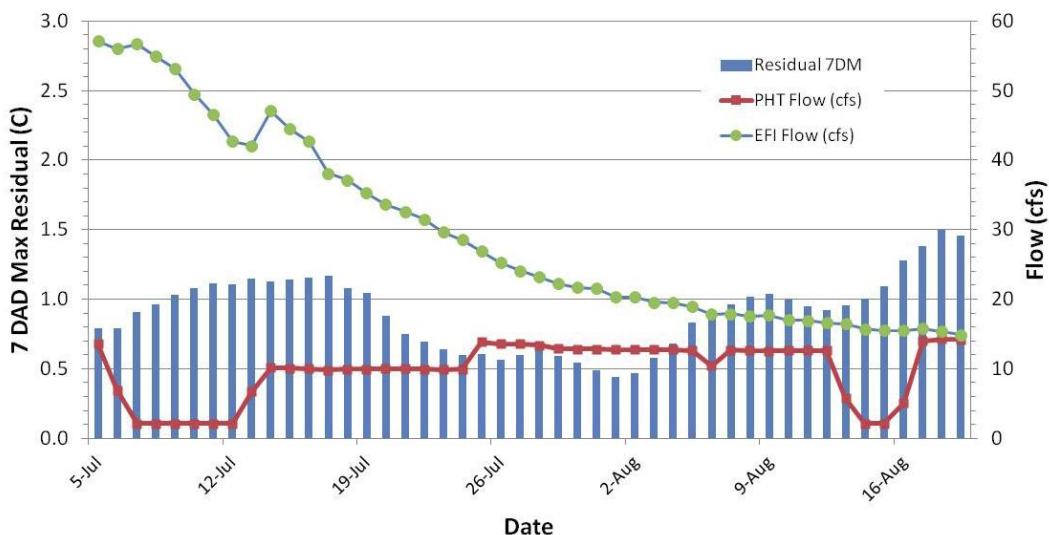
(56) "Seven-Day Average Maximum Temperature" means a calculation of the average of the daily maximum temperatures from seven consecutive days made on a rolling basis. (65) "Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and background. If receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then waste load allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.

### 6.6.3 Present Conditions

The diversion of flow from the East Fork Wallowa river to the Project Penstock and Powerhouse and eventual discharge to the West Fork Wallowa River affects physical flow conditions such as depth, velocity and wetted width. These changes can affect water quality parameters such as temperature, and dissolved oxygen, which is temperature dependent. Monitoring data collected for the re-licensing of the Project the temperature of water entering the Project from upstream on the East Fork Wallowa River exceeds the temperature criteria of 12° C during portions of July and August and increases downstream through the by-pass reach of the East Fork.

**Figure 21** was prepared using temperature data from the inflow of the project (EFI) and the monitoring station in the lower portion of the by-pass reach (BPL) collected in July and August 2012 when Project inflows exceeded 12°C. It also includes flow data from the inflow (EFI) and the powerhouse discharge to the tailrace (PHT). The bar graph columns represent the difference (residuals) between the 7-Day Average Maximum water temperatures at site EFI (representing

natural inflow conditions) and site BPL (representing potential Project flow-related effects). The residual values shown in the bar graph indicate an increase in water temperature of approximately 0.5 to 1.5° C through the by-pass reach as it descends approximately 1,200 feet in elevation. The flow data include in **Figure 21** include two periods of time when the project was shut down and the full flow of the East Fork was present in the by-pass reach. These periods were July 7 to July 12 and August 13 to August 16. These periods are indicated by sharp drops in flow from the powerhouse (PHT). There appears to be no obvious change in the residual temperature values over periods when the Powerhouse is shut down verses when water is diverted to the powerhouse during Project operation.



**Figure 21: Residual 7-Day Average Maximum water temperature between sites EFI and BPL and corresponding flows at sites EFI and PHT, July 5 – August 20, 2012.**

Monitoring data from the West Fork Willowa River indicate that it is cooled by the discharge from the Project Tailrace. Increases in flow in the East Fork will decrease flow from the tailrace, and cause slight warming of the approximately 0.5 mile reach of the West Fork above the confluence with the East Fork. This change will move the flow and temperature profiles of both forks of the Willowa River closer to pre-Project conditions.

### 6.6.4 Applicant’s Position

PacifiCorp has stated that they feel that no specific Project-related action related to water temperature control or management is necessary (**PacifiCorp, 2015**). PacifiCorp goes on to reference the temperature monitoring data that show the project impacts on temperature were not measurable (less than 0.3°C), and the proposed increase in flow in the bypass reach of the East Fork will provide additional protection from temperature increases.

### 6.6.4 DEQ Evaluation

DEQ has reviewed the data presented by PacifiCorp and agrees with the conclusion that the Project has no measurable impact on water temperatures. Short-term temperature monitoring of the tailrace outfall will be required after the new tailrace is in operation. This monitoring is intended to allow the calculation of dissolved oxygen saturation, which is temperature dependent. No additional temperature monitoring or temperature management actions are required.

## 6.7 Turbidity

### 6.7.1 Applicable Standard

The applicable standard is set forth in OAR 340-041-0036:

*Turbidity (Nephelometric Turbidity Units, NTU): No more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction or other legitimate activities and which cause the standard to be exceeded may be authorized provided all practicable turbidity control techniques have been applied and one of the following has been granted:*

*(a) Emergency activities: Approval coordinated by the Department with the Oregon Department of Fish and Wildlife under conditions they may prescribe to accommodate response to emergencies or to protect public health and welfare;*

*(b) Dredging, Construction or other Legitimate Activities: Permit or certification authorized under terms of section 401 or 404 (Permits and Licenses, Federal Water Pollution Control Act) or OAR 141-085-0100 et seq. (Removal and Fill Permits, Division of State Lands), with limitations and conditions governing the activity set forth in the permit or certificate.*

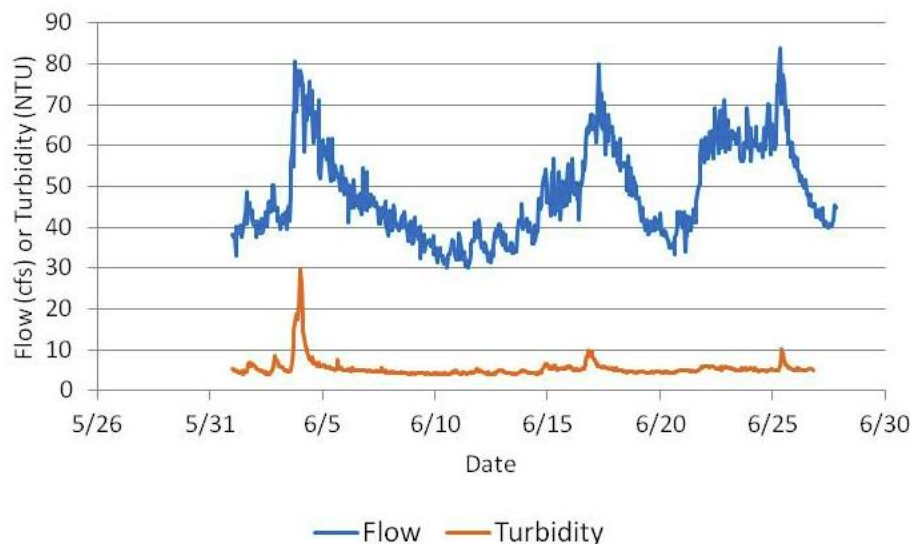
### 6.7.2 Application of Standard

Turbidity is an optical property which measures the lack of water clarity caused by the presence of suspended particles. Turbidity causes light to be scattered and absorbed rather than transmitted through water. Turbidity can increase light extinction and reduce photosynthesis and primary production. Reduced visibility caused by turbid waters can also cause behavioral changes such as prey identification, foraging, and social interaction by visually-oriented species such as salmonids.

Turbidity may occur naturally through channel erosion, organic loading, dust deposition, and nutrient influences. Turbidity loading can also come from a variety of anthropogenic point and non-point discharge sources. Oregon applies the numeric turbidity criterion to protect broad classes of beneficial uses including drinking water, safety, aesthetics, recreation, and agricultural and industrial uses from unwanted or potentially harmful degradation. As stated in Section 6.7.1 above, short-term exceedance of the turbidity criteria can be authorized by DEQ under a 401 Water Quality Certification.

### 6.7.3 Present Conditions

Turbidity and flow measurements collected in June 2012 are presented in **Figure 22**. Turbidity levels are generally low, often around 5 NTU or less, with spikes to approximately 10 NTU when flows increase. There is one spike in turbidity up to approximately 30 NTU that coincides with the first high flow of the year in early June. Similar high flow events later in the month of June were not associated with turbidity levels above 10 NTU.



**Figure 22: Continuous turbidity and flow monitoring results at site BPL in East Fork Wallowa River, June 2012.**

### 6.7.4 Applicant's Position

PacifiCorp has proposed to stop the practice of flushing accumulated sediment from the Project forebay during the summer low-flow period and instead flush the sediment from the forebay during the peak spring runoff in the month of June. Annual forebay flushing would remove approximately 250 to 500 cubic yards of accumulated sediment from the forebay into the East Fork bypass reach. Flushing during high flows will allow the accumulated sediment to pass downstream and be distributed when sediment levels are already naturally elevated. Under the proposed sediment management program, flushing would last no more than 24 to 72 hours.

### 6.7.4 DEQ Evaluation

On May 26, 2015, DEQ issued an individual CWA §401 Water Quality Certification for USACE Permit NWP-2013-00408 that was issued on April 9, 2012. This permit allows sediment flushing from the Project Forebay to be covered under USACE Nationwide Permit No. 3. This certification expires on May 18, 2017 or upon issuance of a new FERC license, whichever comes first. The certification conditions restrict sediment flushing to the month of June when flows in the East Fork Wallowa River exceed 15 cubic feet per second (cfs). Flushing may be performed for up to 72 cumulative hours. Monitoring of turbidity at a downstream location in the East Fork Wallowa River is required, with results to be reported to DEQ within 60 days of completing flushing.

DEQ has included the conditions from the May 26, 2015 §401 Water Quality certification in the §401 Water Quality Certification for the new FERC license.

## **7. Evaluation of Compliance with Sections 301, 302, 303, 306 and 307 of the Federal Clean Water Act**

In order to certify a project pursuant to §401 of the federal Clean Water Act, DEQ must find that the project complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of that Act and state regulations adopted to implement these sections. Sections 301, 302, 306 and 307 of the federal Clean Water Act deal with effluent limitations, water quality related effluent limitations, national standards of performance for new sources and toxic and pretreatment standards. All of these requirements relate to point source discharges and are the foundation for conditions to be incorporated in National Pollution Discharge Elimination System (NPDES) permits issued to the point sources. Point source discharges at hydroelectric projects may include cooling water discharges, stormwater, and sewage discharges.

Section 303 of the Act relates to Water Quality Standards and Implementation Plans. The federal Environmental Protection Agency (EPA) has adopted regulations to implement Section 303 of the Act. The EQC has adopted water quality standards consistent with the requirements of Section 303 and the applicable EPA rules. The EQC standards are codified in OAR Chapter 340, Division 41. EPA has approved the Oregon standards pursuant to the requirements of Section 303 of the Act. Therefore, the Project must comply with Oregon Water Quality Standards to qualify for certification. As discussed above in this report, the proposed Project will comply with Oregon Water Quality Standards and therefore Section 303 of the Clean Water Act, provided the conditions to the §401 Certification are satisfied.

### Required NPDES Permits

DEQ requires stormwater permits for certain industries based on Standard Industrial Classification (SIC) codes. The Occupational Safety and Health Administration (OSHA) assigns SIC Code 4911 to Electric Services facilities engaged in “electric power generation, transmission, and distribution.” DEQ does not regulate stormwater discharge from facilities with SIC Code 4911 under NPDES General Permit 1200-Z. Based on the SIC Code assigned to the Project, DEQ does not require PacifiCorp to obtain an NPDES 1200-Z industrial stormwater permit.

Facilities engaged in upland construction activities which will disturb more than one acre of land and which may reasonably result in surface water discharge to waters of the state must obtain a construction stormwater permit from DEQ. Certain actions required of Pacificorp pursuant to a new FERC License may require that PacifiCorp obtain a NPDES 1200-C construction stormwater permit prior to construction. DEQ will condition this §401 water quality certification to require PacifiCorp to obtain all applicable permits prior to engaging in activities which may result in discharge to waters of the state.

## 8. Evaluation of Compliance with Other Requirements of State Law

Once a Project is determined to qualify for a §401 certification, additional determinations may be made to identify additional conditions that are appropriate in a certification to assure compliance with other appropriate requirements of state law, pursuant to §401(d) of the Clean Water Act. Such requirements are “appropriate” if they have any relation to water quality, see *Arnold Irrigation Dist. v. DEQ*, 79 Or App 136 (1986), and may include requirements as to water quantity if necessary to protect a beneficial use. See *PUD No.1 of Jefferson Co. v. Washington Dept. of Ecology*, 511 U.S. 700 (1994).

### 8.1 Department of State Lands

ORS 196.810 requires that permits be obtained from the Oregon Department of State Lands (DSL) prior to any fill and removal of material from the bed or banks of any stream. Such permits, if issued, may be expected to contain conditions to assure protection of water quality so as to protect fish and aquatic habitat.

The proposed new license will include construction activities which may require a removal-fill permit from DSL, a dredge and fill permit from the Corps pursuant to § 404 of the Clean Water Act, and a §401 water quality certification from DEQ. PacifiCorp must first obtain all applicable permits, certificates, and authorizations prior to engaging in activities required under the terms of a new FERC License.

### 8.2 Department of Fish and Wildlife

The state laws summarized below are administered by the Oregon Department of Fish and Wildlife and pertain to providing and maintaining passage around artificial obstructions, protecting aquatic habitat and protecting and restoring native fish stocks.

- **ORS 541.405 Oregon Plan for Salmon and Watersheds**  
Restore native fish populations and the aquatic systems that support them, to productive and sustainable levels that will provide environmental, cultural and economic benefits.
- **ORS 496.012 Wildlife Policy**  
This statute establishes ODF&W’s primary directive to prevent serious depletion of any indigenous species and to maintain all species of fish and wildlife at optimum levels.
- **ORS 496.435 Policy to Restore Native Stocks**  
Restore native stocks of salmon and trout to historic levels of abundance.
- **ORS 509.580 - 509.645 ODF&W’s Fish Passage Law**  
Provide upstream and downstream passage at all artificial obstructions in Oregon waters where migratory native fish are currently or have historically been present.
- **OAR 635-007-0502 through 0509 Native Fish Conservation Policy**

- **OAR 635-500-0100-0120** Trout Management  
Maintain the genetic diversity and integrity of wild trout stocks; and protect, restore and enhance trout habitat.
- **OAR 635-415-0000-0030** Fish and Wildlife Habitat Mitigation Policy

Fish passage and screening requirements for this Project are not triggered due to the fact that the Project dam is located upstream of natural passage barrier. Pacificorp has developed flow improvement plans in consultation with ODFW, USFWS, and the U.S. Forest Service. The plan calls for improved minimum flows which will expand Bull trout habitat and improve fish passage in the by-passed reach of the East Fork Wallowa River. ODFW and USFWS have specified maximum ramping rates for the bypass reach during restart of the Project after shut down events. The tailrace discharge point will be modified to exclude Bull trout and eliminate the risk of fish stranding during tailrace dewatering events. The plan also includes population and genetic studies of the Bull trout that will assist these agencies in management of the local Bull trout population. DEQ participated in this process and agrees that the fish habitat improvement plans meet the requirements of the ODF&W administered statutes that are described above.

## 8.3 Department of Land Conservation and Development

ORS Chapter 197 contains provisions of state law requiring the development and acknowledgement of comprehensive land use plans. This chapter also requires state agency actions to be consistent with acknowledged local land use plans and implementing ordinances. A land use Compatibility Statement signed by the Wallowa County Planning Department is included in the 401 Certification application. The form (dated February 11, 2015) from the County indicates that the Project is a pre-existing nonconforming use allowed outright by County Zoning Code, WCOA 11.015.

## 8.4 Department of Environmental Quality

### Onsite Septic Systems

On-site disposal of sewage is governed by ORS 454.705 et. seq. and OAR Chapter 340, Divisions 71 and 73. The purpose of these rules is to prevent health hazards and protect the quality of surface water and groundwater.

PacifiCorp indicates there are no plans for waste facilities at the Project location.

### Hazardous Materials

ORS 466.605 et. seq. and ORS 468.780-815 establish requirements for reporting and cleanup of spills of petroleum products and hazardous materials. ORS 468.742 requires submittal of plans and specifications for water pollution control facilities to DEQ for review and approval prior to construction. One of the purposes of these statutes and rules is to prevent contamination of surface or groundwater.

PacifiCorp submitted an oil Spill Prevention, Control and Countermeasure (SPCC) Plan pursuant to ORS Chapter 466 (**PacifiCorp, 2014b**).



### NPDES Permits

Oregon rule (OAR 340-045-0015) requires facilities that discharge to water to secure NPDES permits for discharges of pollutants to surface water.

Prior to engaging in future construction activities which may disturb more than one acre and which will result in stormwater discharge to surface waters, PacifiCorp must first obtain an NPDES 1200-C construction stormwater permit from DEQ.

## **8.5 Water Resources Department**

Under ORS 468.045(2) DEQ is required to make findings that its approval or denial is consistent with the standards established in ORS 543A.025(2) to (4).

These standards can be summarized into the following five areas:

1. Standards that mitigate, restore and rehabilitate fish and wildlife resources adversely affected by the Project;
2. Any plan adopted by the Pacific Northwest Power and Conservation Planning Council; the Environmental Quality Commission's water quality standards;
3. Operational standards that ensure the Project does not endanger public health or safety, including "practical protection from vulnerability to seismic and geologic hazards,";
4. Standards that protect, maintain, or enhance wetland resources such that the Project may not result in a net loss to existing wetland resources; and
5. Standards that protect, maintain, or "enhance other resources in the Project vicinity including recreational opportunities, scenic and aesthetic values, historic, cultural and archaeological sites, and botanical resources" such that reauthorization may not result in net loss to these existing resources.

PacifiCorp has two water rights which allow use of a total 15 cfs from the East Fork Willowa River and a third water right that allows use of 1 cfs from Royal Purple Creek, for the generation of hydroelectric power. The water rights have priority dates ranging from 1920 to 1928. The diversions are allowed year-round.

The water use for this project is authorized under a power claim water right, PC 544 / Certificate 26509, which has no time limit associated with it. For the purposes of re-authorization, OWRD is only "monitoring" the proceedings. This water right is not subject to the reauthorization under ORS 543A. OWRD would only be actively involved with the project if an element of the water right is changed, or if the project is decommissioned.

## **9. Public Comment**

On February 24, 2016, DEQ issued a notice inviting public review and comment on the proposed certification decision. DEQ scheduled a public hearing to discuss the decision on March 15, 2016 in Pendleton. The public comment period concluded at 5:00 pm on March 30, 2016. No comments were received.

## **10. Conclusions and Recommendation for Certification**

DEQ has evaluated PacifiCorp's application for §401 water quality certification and related supporting documents and considered public comments. DEQ has determined that the proposed Project will comply with the applicable provisions of Sections 301, 302, 303, 306 and 307 of the Clean Water Act, OAR Chapter 340, Division 41 and other appropriate requirements of state law provided PacifiCorp implements the conditions proposed in this document.

Based on the preceding analysis and findings, it is recommended that pursuant to §401 of the Federal Clean Water Act and ORS 468B.040, the Director, or assigned signatory, conditionally approve the application for certification of the Wallowa Falls Hydroelectric Project, FERC Project No. P-308, consistent with the findings of this document.

# 11. References

**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.

**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.

**PacifiCorp, 2011.** Wallowa Falls Hydroelectric Project FERC No. P-308 Notice of Intent to Relicense and Pre-Application Document. PacifiCorp Energy, Portland, Oregon, February 2011.

**PacifiCorp, 2012.** Wallowa Falls Hydroelectric Project FERC No. P-308, Study Progress Report (Draft Technical Report), Aquatic Resources. PacifiCorp Energy, Portland, Oregon. December, 2012.

**PacifiCorp, 2013.** Instream Flow Updated Study Report (Final Technical Report). PacifiCorp Energy, Portland Oregon. December 2013.

**PacifiCorp, 2014a.** Wallowa Falls Hydroelectric Project FERC No. P-308. Updated Study Report (Final Technical Report), Aquatic Resources. Prepared by PacifiCorp Energy, Portland Oregon. January 2014.

**PacifiCorp, 2014b.** Wallowa falls Hydroelectric Plant Oil spill Prevention, control and Countermeasure Plan (SPCC Plan). PacifiCorp Energy, Portland, Oregon, December 2014.

**PacifiCorp, 2015.** Application for Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and ORS468B.040 for the Wallowa Falls Hydroelectric Project (FERC No. P-308) in Wallowa County, Oregon. PacifiCorp, Portland, Oregon. April 2015.

**U.S. Fish and Wildlife Service (USFWS).** 2011. Critical Habitat Mapper. <http://criticalhabitat.fws.gov/crithab/>. Accessed September 2011.