Kleinschmidt

April 12, 2018

VIA DROPBOX SUBMITTAL

Shannon Ames
Executive Director
Low Impact Hydropower Institute
329 Massachusetts Ave, Suite 2
Lexington, MA 02420

LIHI Formal Application Submission for the
Opal Springs Hydroelectric Project (FERC No. 5891)

Dear Ms. Ames:

On behalf of the Deschutes Valley Water District (DVWD), Kleinschmidt Associates submits the enclosed Low Impact Hydropower Institute (LIHI) Application for the Opal Springs Hydroelectric Project (FERC No. 5891) (Project). This submittal is intended to initiate Formal Application Review, which is the final step in the LIHI application process. The Project is located near the town of Culver, Oregon, and is a hydroelectric facility that currently operates under a Federal Energy Regulatory Commission (FERC) License issued on November 2, 1982.

Forthcoming is the required $6,540.00 non-refundable fee, which covers the cost of Formal Application Review. We understand that the Formal Application will undergo a final application review conducted by the Application Reviewer. If the Formal Application sufficiently meets LIHI requirements and gains a certification recommendation, the Application Reviewer's report shall be posted on LIHI's web page for a sixty-(60) day public comment period. If at the end of the 60-day comment period no appeal is requested, a Low Impact Hydropower Certification will be issued to the facility.

We look forward to discussing the results of this Review. Should you have questions or concerns, please contact me at nuria.holmes@kleinschmidtgroup.com.

Sincerely,

Nuria V. Holmes
Regulatory and Licensing Coordinator

NVH:DLM
Enclosures: Sworn Statement
LIHI Application

cc: Edson Pugh, DVWD

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LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

OPAL SPRINGS HYDROELECTRIC PROJECT
(FERC NO. 5891)

Prepared for:

Deschutes Valley Water District
Madras, Oregon

Prepared by:

Kleinschmidt
Portland, Oregon
www.KleinschmidtGroup.com

April 2018

LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

OPAL SPRINGS HYDROELECTRIC PROJECT (FERC NO. 5891)

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LOW-IMPACT HYDROPOWER POWER INSTITUTE
CERTIFICATION APPLICATION

OPAL SPRINGS HYDROELECTRIC PROJECT
(FERC NO. 5891)

1.0 FACILITY DESCRIPTION

The Opal Springs Hydroelectric Project (FERC No. 5891) (OSHP or Project), owned and operated by the Deschutes Valley Water District (DVWD), lies within a strongly groundwater influenced section of the Lower Crooked River, and within a deep gorge approximately 5 miles southwest of Culver, Oregon (Figure 1 and Figure 2). The Project extends from River Mile (RM) 6.9 on Crooked River, less than a mile above Lake Billy Chinook, up to RM 7.8, 0.2 miles downstream of a federally designated Wild-and-Scenic section of the river.

The Project consists of a 21-foot-high, 200-foot-long concrete capped rockfill diversion dam creating a pool with a storage capacity of 106.4 acre-feet and a surface area of 11.1 acres at normal maximum pool elevation of 2004.21 feet NGVD 29; a 44-foot by 33-foot rectangular concrete intake structure 32 feet in height; two 12.5-foot-diameter, 1,157-foot-long buried corrugated metal conduits; a 30-foot-diameter steel surge tank-bifurcator; a 16-foot-diameter, 160-foot-long steel penstock; two existing turbine-driven irrigation pumps, one rated at 175 horsepower and the other rated at 480 horsepower; a powerhouse containing one 4.3 megawatt (MW) generating unit; a 250-foot long, 20.8 kilovolt (KV) underground transmission line; and appurtenant facilities.

The OSHP is operated as a run-of-river project. Under License Article 36, DVWD is required to discharge a continuous minimum flow of 50 cubic feet per second (cfs) or the inflow to the reservoir, whichever is less, for the purpose of protecting and enhancing aquatic resources in the Crooked River. On June 14, 2012, the Federal Energy Regulatory Commission (FERC or Commission) approved of a short-term modification to License Article 36 so that a portion of the 50 cfs bypass flow could be transferred to a downstream release point in order to aid in attracting migrating anadromous fish to a temporary trap for DVWD's interim trap and haul fish passage program. DVWD temporarily releases a minimum flow adjacent to a trap on the downstream toe

of the dam, for purposes of attracting upstream migrating adult salmonids The OSHP water right is for 1,772.5 cfs, which may be fully used when river flows exceed 1,822 cfs.

FIGURE 1 OPAL SPRINGS HYDROELECTRIC PROJECT

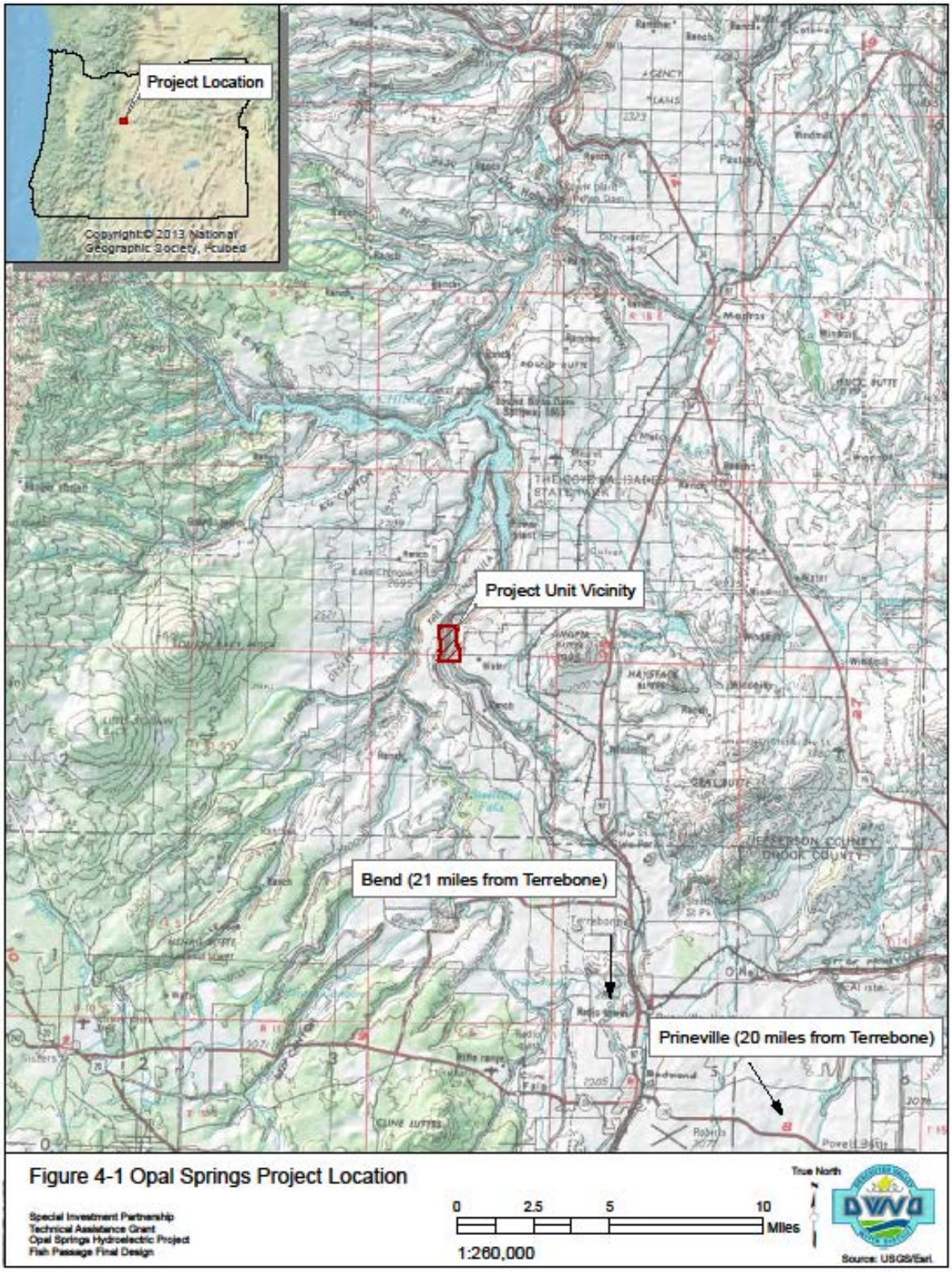

FIGURE 2 OPAL SPRINGS HYDROELECTRIC PROJECT LOCATION OVERVIEW

1.1 OFFER OF SETTLEMENT AGREEMENT AND PROPOSED NON-CAPACITY PROJECT AMENDMENT

The OSHP was authorized in 1982 and commissioned in 1985. Because anadromous fish had been extirpated from the Upper Deschutes Basin in the 1960s due to the downstream Pelton Round Butte (PRB) Project (FERC No. 2030), fish passage was not required or provided at the time of licensing of the Project. In 2007, salmon and steelhead were reintroduced in the Upper Deschutes Basin, upstream of the PRB Project following the completion of upstream and downstream passage facilities. The reintroduced fish are repopulating three major tributaries to the Deschutes River including the Crooked River where the OSHP is located.

The first salmon and steelhead returning to the PRB Project appeared in 2012 and the species have been in the OSHP vicinity since that time. Located at the lower end of the Crooked River, the OSHP is a barrier to passage into this tributary, which would otherwise provide spawning, rearing, and foraging habitat for these anadromous species. Bull trout, a species listed under the federal Endangered Species Act (ESA), also is present below the OSHP, which is considered critical habitat under the ESA. In response to a request from the Oregon Department of Fish and Wildlife (ODFW), DVWD has been passing fish above the OSHP through a trap-and-haul effort voluntarily since 2012.

To facilitate migration across OSHP, DVWD voluntarily engaged with relevant government agencies and non-governmental organizations in 2008. For over 4 years, DVWD and interested parties investigated, discussed, and negotiated a collaborative solution.

In October 2011, DVWD and the following agencies and entities ("Parties") came to a balanced agreement for construction and maintenance of fish passage facilities and fisheries management at the OSHP:

- U.S. DOI Bureau of Indian Affairs (BIA)
- U.S. DOI Bureau of Land Management (BLM)
- U.S. DOI Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service (NMFS)
- Oregon Department of Fish and Wildlife (ODFW)
- Trout Unlimited (TU)

The Settlement Agreement was later amended and restated in 2015 and submitted in tandem with DVWD's October 8, 2015, Application for Non-Capacity Amendment for Opal Springs Fish Passage Project. The Non-Capacity License Amendment, as recommended in the 2015 Settlement Agreement, provides for upstream and downstream fish passage at the Project, and an adaptive management structure for managing the fish passage facilities throughout the term of the amended license.

In late-2016 and early-2017, the Licensee put out a Request for Proposals for the fish ladder and pool raise project construction. Bids came in much higher than anticipated, and the project's License Amendment was put in abeyance with FERC through December 2017. After several months of value-engineering efforts and project re-resign involving the Parties, and with a large grant from the Oregon Water Resources Department and other funding partners, DVWD was able to lower the project cost and proceed with construction. **The *revised* License Amendment and updated Project Description were re-filed with FERC on October 31, 2017.[1] On December 14, 2017, DVWD also re-filed Appendix B of the Settlement Agreement to ensure consistent language between the new Project Description and what was in Appendix B (Fish Passage Plan).[2] As demonstrated in the consultation record, the Parties are fully supportive of the change, and have asserted that the changes, while reducing costs and scope of the construction, are not inconsistent with the 2015 Agreement.**

The *revised* Non-Capacity License Amendment and Settlement Agreement provide a structure whereby the DVWD will:

1. Construct a fish ladder to provide passage into the spawning, rearing, and foraging habitats of the Crooked River sub-basin for adult anadromous summer Steelhead, spring Chinook salmon, and migratory bull trout, the latter of which are listed as threatened under the Endangered Species Act (ESA). Additionally, the facilities will reconnect populations of native redband trout upstream and downstream of the Project. Designs and specifications for the fish passage facilities are to be developed in consultation with the Opal Springs Fish Passage Working Group.
2. Raise the maximum operating elevation of the Project reservoir from 2,004.21 feet elevation NGVD 29 to 2,009.21 feet NGVD 29, through modifications to the existing dam. This new elevation will enable the DVWD to construct alternative downstream

[1] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20171031-5322
[2] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14777354

passage routes for migrating fish and will enable the establishment of a water credit system to supplement flow into the Project's bypass reach and through the fish ladder.

3. Establish a water credit system known as the Bypass Flow Accrual Account (BFAA). This water would serve as both attraction flow for adult fish that may be holding in the Project's tailrace, and as alternative passage for downstream migrants. Increased head resulting from the pool-raise would allow DVWD to generate additional power to partially offset the cost of fish ladder construction and operation as well as costs associated with the ladder's monitoring and evaluation program. Water credits would be accrued in lieu of actual stored water, given that the Project has no storage capacity, and turbine discharge would be reduced when exchanging water credits for actual bypass flows. The Licensee would administer the BFAA, but decisions regarding its use would be made by the Fish Managers (ODFW), consistent with Opal Springs Fish Passage Working Group's BFAA Annual Allocation Plan, and any terms and conditions established by the USFWS or NMFS through ESA consultation.
4. Implement a monitoring and evaluation (M&E) program for assessing upstream and downstream passage relative to the performance objectives.
5. Adaptively manage the Project to meet the fish passage performance objectives.
6. Implement the Opal Springs Fish Passage and Protection Plan.
7. Provide annual reports addressing the activities within the calendar year relating to the fish passage facilities, O&M measures, BFAA, M&E program, and other fisheries management activities.
8. Provide inspection rights to members of the Fish Passage Working Group.
9. Comply with typical Commission requirements regarding construction at a project.

Corresponding to the Offer of Settlement Agreement, DVWD proposes to amend the Project license such that DVWD may (1) increase normal maximum pool elevation from 2,004.21 feet NGVD 29 to 2,009.21 feet NGVD 29, (2) construct a fish ladder on the east (right) bank of the diversion structure to facilitate volitional upstream fish passage and (3) modify the existing roughened spillway by create a single smooth chute to enable safe, timely, and effective downstream fish passage. DVWD therefore proposes that the non-capacity amendment include an updated description of Project works: a 21-foot-high, 200-foot-long concrete capped rockfill diversion dam, controlled with fixed flashboards creating a pool with a storage capacity of 119-acre-feet and area of 14.4 acres at normal maximum pool elevation of 2009.21 feet NGVD 29; a 30 cfs vertical slot ladder; a 44-foot by 33-foot, rectangular, concrete intake structure 34 feet in height; two 12.5-foot-diameter, 1,157-foot-long, buried, corrugated-metal conduits; a 30-foot-diameter steel surge tank-bifurcator; a 16-foot-diameter, 160-foot-long steel penstock; two existing turbine-driven irrigation pumps one rated at 174 horsepower and the other rated at 480

horsepower; a powerhouse containing one 4.3 MW generating unit; a 250-foot long, 69.5 KV overhead transmission line; and appurtenant facilities. Under the proposed amendment, the Project boundary would also be amended to extend upstream nearly (but not quite) to river mile 8.0, the lower boundary of the Wild-and-Scenic section (Figure 3).

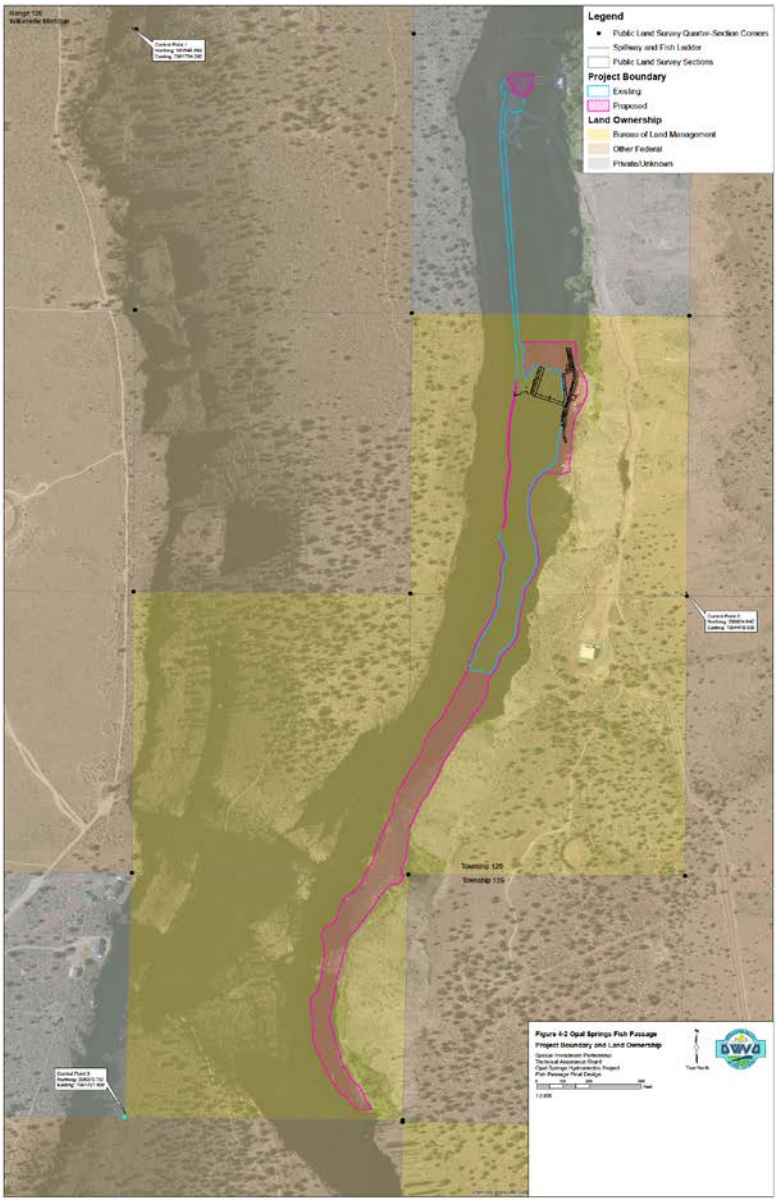

FIGURE 3 EXISTING AND PROPOSED PROJECT BOUNDARIES

Under the 2015 Non-Capacity License Amendment (*revised in 2017)*, the Project will continue to operate as a run-of-river facility, and the 50 cfs minimum instream flow requirement will be maintained. Gate No. 1 and the associated concrete-lined spill channel are sized to provide a

minimum total flow of 864.5 cfs, which, combined with the ladder flow of 30 cfs and the maximum turbine flow of 1,772.5 cfs, is equal to the 5% annual exceedance streamflow of 2,667 cfs.

1.2 FACILITY DESCRIPTION INFORMATION FOR OPAL SPRINGS HYDROELECTRIC PROJECT (FERC NO. 5891)

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
Name of the Facility		Opal Springs Hydroelectric Project (FERC No. 5891 or OSHP) referred to as the Project throughout this application. Website: www.dvwd.org
Location	River name (U.S. Geologic Survey [USGS] proper name)	Crooked River
	River Mile:	RM 7.2 on the Crooked River
	River Basin:	Deschutes River Basin.
	Nearest town, county, and state:	Culver, Jefferson County, Oregon.
	River Mile of Dam above next major river:	Other dams on Crooked River: Upstream of the Project is the Crooked River Central Diversion Dam near RM 37, People's Irrigation District Dam near RM 47; Rice-Baldwin Dam near RM 57, and the Bowman Dam near RM 70. Both the Bowman Dam and Ochoco Reservoir Dam (located on Ochoco Creek) manage flood control in the Crooked River Watershed as well as irrigation flows. The Pelton Round Butte Hydroelectric Project (FERC No. 2030) is located downstream of OSHP at RM 111 on the Deschutes River.
	Geographic latitude:	44°29'10.44"N
	Geographic longitude:	121°17'53.91"W

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
Facility Owner	Application Contact Names	Edson Pugh, General Manager Deschutes Valley Water District 881 SW Culver Highway Madras, Oregon 97741
	Facility owner (individual and company names):	Deschutes Valley Water District 881 SW Culver Highway Madras, Oregon 97741
	Representative in LIHI certification	Nuria V. Holmes Kleinschmidt Associates 1500 NE Irving Street, Suite 550 Portland, OR 97232
Regulatory Status	FERC Project Number and Issuance and expiration dates	FERC Project No. P-5891 Term of License: 50-years Issued on: November 2, 1982 Expires on: November 1, 2032
	FERC license type or special classification (e.g., "qualified conduit")	Major license Order issuing Deschutes Valley Water District license (Major) for Operation & Construction of the Opal Springs Hydroelectric Project under P-5891 (November 4, 1982)
	Water Quality Certificate identifier and issuance date, plus source agency name	In accordance with Section 401 of the Clean Water Act (CWA), DVWD applied on February 29, 2016 for an Oregon Department of Environmental Quality (ODEQ) Water Quality Certificate to accompany the Project's 2015 Non-Capacity License Amendment (*revised in 2017)*. On October 26, 2016, a Final Water Quality Certificate was issued. Final 401 Water Quality Certification from Oregon Department of Environmental Quality pursuant to Section 401 of the Clean Water Act (October 26, 2016)

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	April 18, 2012 Modification of In-stream Flows and Point of Release - Article 36 October 8, 2015 Settlement Agreement/ Non-Capacity License Amendment Application November 5, 2015 FERC Acceptance of 2015 Settlement Agreement/Non-Capacity License Amendment Filing November 5, 2015 USFWS Biological Opinion under Section 7 of the Endangered Species Act December 31, 2015 ODFW Recommendations January 21, 2016 NMFS Preliminary Prescriptions April 5, 2017 FERC Order Granting DVWD Request for Abeyance through December 31, 2017 October 31, 2017 Updated to Project Description and EA for Non-Capacity License Amendment December 12, 2017 FERC Issues Notice of Revised Application and Solicitation for Motion to Intervene December 13, 2017 Re-Issued Oregon DEQ 401 Water Quality Certificate December 14, 2017 DVWD Update to Appendix B of the Settlement Agreement (Fish Passage Plan) December 21, 2017 FERC Comments on Revised 100% Drawings December 27, 2017 USFWS Files Updated Biological Opinion January 9, 2018 USFWS Modified Comments, Recommendations, T&Cs and Prescriptions January 11, 2018 ODFW Recommendations January 12, 2018 NOAA Fisheries Comments and Fishway Prescriptions January 18, 2018 DVWD Notice of Revised Environmental Assessment February 14, 2018 Oregon DEQ Revised Environmental Assessment

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
Power Plant Characteristics	Date of Initial Operation (past or future for operational applications)	The OSHP was licensed by FERC in 1982 and the facility was commissioned in 1985.
	Total name-plate capacity	4.3 MW
	Average annual generation (MWh)	~29,509 MWh
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	The Project powerhouse contains one 4.3 MW Siemens-Allis generating unit with a 3-meter Allis Chalmers horizontal tube type turbine. The turbine's maximum hydraulic capacity is 1,772.5 cfs while the minimum is 864.5 cfs.
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	Run-of-river[3]
	Dates and types of major equipment upgrades	No major equipment upgrades have occurred at the Project.
	Dates, purpose, and type of any recent operational changes	No operational changes have occurred at the Project.

[3] The LIHI 2nd Edition Handbook characterizes a "run-of-river" facility as one in which the outflow of the facility is within reasonable measurement accuracy (+/- 10%) of the inflow of the facility, measured on an hourly basis.

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
	Plans, authorization, and regulatory activities for any facility upgrades	Under the 2015 Non-Capacity License Amendment (*revised in 2017)*, the existing normal maximum reservoir elevation would raise by approximately 3 feet. The additional 3 feet would provide an average annual increase of 3,032 MWh as a result of increased head. Under the 2015 Non-Capacity License Amendment (*revised in 2017)*, DVWD proposes to: 1) construct an upstream fish ladder to provide passage for migratory bull trout, anadromous summer steelhead, spring Chinook, and redband trout; 2) modify the existing roughened spillway by creating a single smooth chute to enable safe, timely, and effective downstream fish passage; 3) increase normal maximum pool elevation from 2,004.21 feet NGVD 29 to 2,009.21 feet NGVD 29.
Characteristics of Dam, Diversion of Conduit	Date of construction	1920
	Dam height	The original 6-foot-high diversion dam was built in the 1920s to power a turbine pump. The dam was raised 10 feet in 1985 (after obtaining the 1982 Project license).
	Dam width	The OSHP has a 21-foot-high by 175.2-foot-long concrete-capped, rockfill diversion dam topped with 6-foot-high flashboards. Under the 2015 Non-Capacity License Amendment (*revised in 2017)* DVWD proposes to install a single fixed flashboard.
	Spillway elevation and hydraulic capacity	Spillway elevation: 2002 feet NGVD 29 Hydraulic capacity: 8,000 cfs.
	Tailwater (downstream water surface) elevation	1980.8 feet NGVD 29

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	Two (2) 12.5-foot-diameter, 1,157-foot-long buried corrugated metal conduits, a 30-foot-diameter steel surge tank-bifurcator, and a 16-foot-diameter, 160-foot-long steel penstock.
	Dates and types of major, generation-related infrastructure improvements	No major, generation-related infrastructure improvements have occurred since the facility was completed in 1985.
	Designated facility purposes	Generation of Power
	Water source	Crooked River – a body of water fed by sufficient springs, rainwater, and snowmelt.
	Water discharge location or facility	The OSHP discharges water from its powerhouse located approximately 1,500 feet downstream of the dam.
Characteristics of the Reservoir and Watershed	Gross volume (Dam)	OSHP currently has a pool with a storage capacity of 106.4-acre-feet and an area of 11.1 acres at normal maximum pool elevation of 2,004.21 feet NGVD 29. Under the 2015 Non-Capacity License Amendment (*revised in 2017)*, DVWD proposes to raise the pool to 2,007.21 feet NGVD 29 with the installation of a single flashboard. The elevated pool level will create a storage capacity of 119-acre-feet and surface area of 14.4 acres at normal maximum pool elevation of 2009.21 feet NGVD 29.
	Surface area at full pool (Dam)	See above.
	Maximum water surface elevation (ft. MSL)	
	Maximum and minimum volume and water surface elevations for designated power pool, if available	N/A

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	Major dams located on the Crooked River upstream of the OSHP include: • Bowman Dam (RM 70) owned by the Bureau of Reclamation, • Rice-Baldwin Dam (RM 57) owned by White Deer Ranch, • People's Irrigation District Dam (RM 47) owned by People's Canal and Irrigation Company, and • Crooked River's Central Diversion Dam (RM 37) owned by the Crooked River Central (CRC).
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	No dams are located on the Crooked River downstream of the OSHP, but the Pelton Round Butte (PRB) Project (FERC No. 2030) owned and operated by Portland General Electric Company is located at RM 100 of the Deschutes River (approx. 9.5 miles downstream from OSHP).
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	OSHP does not operate under any agreements made with upstream or down facilities but does have a water right for 1,772.5 cfs, which may be fully used when river flows exceed 1,822.5 cfs. Once the powerhouse capacity (1,772.5 cfs) is exceeded, excess stream flows during periods of high runoff are passed over the stoplogs as the impoundment is allowed to rise.
	Area inside FERC project boundary, where appropriate	The OSHP FERC boundary area is currently 9.3 acres. The proposed boundary included in the 2015 Non-Capacity License Amendment (*revised in 2017)* is 14.4 acres.

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
Hydrologic Setting	Average annual flow at the dam	Flow has been regulated since 1960 by the Prineville Reservoir, with an active capacity of 152,800 acre-feet, and Ochoco Reservoir, with an active capacity of 46,500 acre-feet. There are many diversions for irrigation upstream from the OSHP, such that a significant portion of the summertime flow comes from springs within 15 miles of the OSHP.
	Average monthly flows (cfs)	Average daily flows at OSHP (Data from USGS Gage 14087400 - Corrected to account for spring flow between the diversion dam and the gage. The correction is 263 cfs, based on 240 cfs of flows at the springs, and 23 cfs of groundwater accretion in the OSHP bypass reach): • January: 1,361 cfs • February: 1,476 cfs • March: 1,650 cfs • April: 1,852 cfs • May: 1,436 cfs • June: 1,117 cfs • July: 1,006 cfs • August: 1,031 cfs • September: 1,097 cfs • October: 1,155 cfs • November: 1,105 cfs • December: 1,224 cfs Average annual flow: 1,292 cfs
	Location and name of relevant stream gauging stations above and below the facility	USGS Gage No. 14087380 (CROOKED RIVER BLW OSBORNE CANYON, NR OPAL CITY, OR). Relevant stream gauging stations below the facility: USGS Gage No. 14087400 (CROOKED RIVER BELOW OPAL SPRINGS, NEAR CULVER, OR)
	Watershed area at the dam	4,300 square miles

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
Designated Zones of Effect	Number of zones of effect	3
	Upstream and downstream locations by river miles	**Impoundment:** RM 8 to RM 7 **Bypass Reach**: RM 7 to RM 6.74 **Tailrace:** RM 6.74 to freshwater spring
	Type of waterbody (river, impoundment, by-passed reach, etc.)	The waters located within the Impoundment ZOE are classified as Riverine by the USFWS National Wetlands Inventory (USFWS 2016).
	Delimiting structures	Zone of Effect #1: **Impoundment** • The Project currently has an impoundment with a surface area of 11.1 acres at normal pool elevation of 2,004.21 feet NGVD 29. Under the 2015 Non-Capacity License Amendment (*revised in 2017)*, DVWD proposes to raise the impoundment to 2,010.31 feet NGVD 29 and expand the surface area to 15 acres normal pool elevation. Zone of Effect #2: **Bypass Reach** • The Project's 0.26-mile-long bypass reach extends from the Project Dam located at RM 7.0 downstream to the Project powerhouse at RM 6.74. This will be unaffected by the proposed modifications, except for beneficial impacts from the BFAA (see below). Zone of Effect #3: **Tailrace** • The Project's 0.03-mile-long tailrace extends from the powerhouse at RM 6.74 downstream to join with the bypass reach, immediately upstream of a the 240 cfs freshwater spring. This will be unaffected by the proposed modifications.

INFORMATION TYPE	VARIABLE DESCRIPTION	FACILITY DESCRIPTION
	Designated uses by state water quality agency	The ODEQ has designated a dozen beneficial uses of the Lower Crooked River (ODEQ 2011a): Public/domestic water supply; Industrial water supply; Livestock watering; Wildlife and hunting; Boating; Aesthetic quality; Private/domestic water supply; Irrigation; Fish and aquatic life; Fishing; Water contact recreation; Hydropower.
Additional Contact Information:	Names, addresses, phone numbers, and e-mail for local state and federal resource agencies	See Section 4 for the Project Contacts Form.
	Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders	See Section 4 for the Project Contacts Form.
Photographs of the Facility	Photographs of key features of the facility and each of the designated zones of effect	Please see Appendix A for photographs of key features of the facility and identification of each designated zone of effect and Appendix B for Project drawings.
	Maps, aerial photos, and/or plan view diagrams of facility area and river basin	

2.0 STANDARDS MATRICES

2.1 ZONE OF EFFECT: IMPOUNDMENT ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	2	3	4	PLUS
A	Ecological Flow Regimes	X				
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection			X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			X

2.2 ZONE OF EFFECT: BYPASS REACH ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection			X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			X

2.3 ZONE OF EFFECT: TAILRACE ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection			X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			X

3.0 SUPPORTING INFORMATION

3.1 ECOLOGICAL FLOW STANDARDS

3.1.1 ECOLOGICAL FLOWS STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
A	1	<u>Not Applicable / De Minimis Effect:</u> • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** This is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

OSHP is operated as a run-of-river facility, which means that the outflow of the facility is within +/- 10% of the inflow to the facility, measured on an hourly basis. Inflow and outflow are not measured at the facility, but the OSHP does not hold back water for peaking purposes or store water for seasonable purposes.

<u>Current Operations</u>

As required under modified 1982 License Article 36, DVWD discharges a continuous minimum flow of 50 cfs or the inflow to the reservoir, whichever is less for the purpose of protecting and enhancing aquatic resources in the Crooked River. Once the powerhouse capacity is exceeded (1,772.5 cfs), excess stream flows during periods of high runoff (typically in the spring) are passed over the stoplogs as the impoundment is allowed to rise. Total river flows before withdrawals for hydropower or instream flows are measured using USGS gage 14087400 below Opal Springs, less 263 cfs (spring water inputs between dam and gage).

Under a voluntary agreement, anadromous salmon and steelhead have been trapped at the project since 2012 and transported to a release site above the Project. Fish and wildlife habitat within the Impoundment ZOE are not specifically evaluated or managed. The overall health of the Impoundment ZOE is maintained through the facility's natural, run-of-river operations.

Update: The OHSP no longer modifies the flows, although the Project has the flexibility for this variance. This may be re-established during construction of the fish ladder.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

Under the 2015 Non-Capacity License Amendment (*revised in 2017)*, DVWD proposes to continue operating OSHP as a run-of-river facility, and under the same flow parameters as noted above. A volitional fish ladder will be constructed in 2018-2019, and the impoundment pool will be raised by 3 feet, allowing the excess water to be released down the fish ladder to attract fish up the ladder and into the impoundment.

3.1.2 ECOLOGICAL FLOW STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
A	2	Agency Recommendation (see Appendix A of the LIHI Standards for definitions): • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations).

OSHP is operated as a run-of-river facility, which means that the outflow of the facility is within +/- 10% of the inflow to the facility, measured on an hourly basis. Inflow and outflow are not measured at the facility, but the OSHP does not hold back water for peaking purposes or store water for seasonable purposes.

Current Operations

Under 1982 License Article 36, DVWD is required to discharge a continuous minimum flow of 50 cfs or the inflow to the reservoir, whichever is less for the purpose of protecting and enhancing aquatic resources in the Crooked River. Flows are measured through a rating curve that correlates release volumes with gate or valve openings.

On June 14, 2012[4], FERC approved of a short-term modification (for a period not to exceed 5 years) to License Article 36 so that a portion of the 50 cfs bypass flow could be transferred to a downstream release point to aid in attracting migrating anadromous fish to a temporary trap for DVWD's interim trap-and-haul fish passage program. Previously under the License Article 36 modification, DVWD temporarily released a minimum flow of 30 cfs from the Opal Springs Project and no more than 20 cfs downstream at an existing fish hatchery ladder (non-project) for the purposes of attracting upstream migrating adult salmonids and providing the necessary water supply to the fish hatchery pools located approximately 950 feet downstream of the dam (non-project).

In response to the to the reintroduction of migrating steelhead and salmon above the PRB Project in 2011, it was agreed upon by agencies that the OSHP flow modification was necessary to provide sufficient attraction flow to divert upstream migrating salmonids into the hatchery for transport above the dam. The hatchery has been identified by members of the Opal Springs Fish Passage Working Group[5], a working group whose purpose is to advise the Licensee on fisheries and habitat issues as specified in the 2015 Settlement Agreement and 2015 Non-Capacity License Amendment (*revised in 2017)* as the preferred interim means of capturing upstream migrants in association with the 2008 Upper Deschutes River Reintroduction Program[6] and prior to the installment of a permanent upstream fish passage facility at OSHP. This temporary flow

[4] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14030478
[5] As described in the 2015 Settlement Agreement, the Fish Passage Working Group means all signatories to the Settlement Agreement (DVWD, NMFS, USFWS, BIA, ODFW, TU, and CTWS).
[6] http://www.winnememwintu.us/wp-content/uploads/2011/09/deschutes_reintro_plan_10-20-08.pdf

modification was only enacted when the temporary fish collection facility was in operation. The ODFW, NMFS, and the USFWS issued letters in support of this temporary modification on April 9, 2012, April 11, 2012, April 12, 2012, respectively.

Under this modification, resource agencies are annually given an opportunity to review and comment on the Project's bypass flows during their reviews of the Annual Flow Monitoring Report (Annual Flow Monitoring Reports are submitted to the FERC pursuant to Ordering Paragraph (C) of the June 14, 2012, license Article 36 modification). Links to the agency approved OSHP 2012 - 2017 Annual Flow Monitoring Report submittals are provided below:

2012 Annual Flow Monitoring Report
2013 Annual Flow Monitoring Report
2014 Annual Flow Monitoring Report
2015 Annual Flow Monitoring Report
2016 Annual Flow Monitoring Report
2017 Annual Flow Monitoring Report

Update: The OHSP no longer modifies the flows, although the Project has the flexibility for this variance. This may be re-established during construction of the fish ladder.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

The OSHP will continue to be operated as a run-of-river facility, and the minimum instream flow requirement of the current license (License Article 36) will be maintained. Gate 1 and the associated concrete-lined spill channel are sized to provide a minimum total flow of 344 cfs, which, combined with the ladder flow of 30 cfs and the maximum turbine flow of 1,772.5 cfs, is slightly less than the 5% annual exceedance streamflow of 2,667 cfs.

When FERC processes the 2015 Non-Capacity License Amendment (*revised in 2017)*, Article 36 will be modified as noted above and future operations will be conducted as described in the preceding paragraph.

The 2015 Non-Capacity License Amendment (*revised in 2017)* will neither modify run of river operations nor the 50 cfs minimum flow requirement. However, through the use of the BFAA this flow will be supplemented at the request of Fish Managers (ODFW) to serve as both

attraction flow for adult fish that may be holding in OSHP's tailrace and as an alternative passage for downstream migrants through the spillway. The minimum bypass flow of 50 cfs will be supplied by the proposed 30 cfs fish ladder flow and 20 cfs of spill flow. Spill flow will normally be supplied by Gate No. 1 adjacent to the proposed fish ladder location. Fish bypass releases will enter a stilling basin adjacent to the proposed fish ladder entrance.

The total BFAA volumes are estimated to be in the order of 20,000 to 25,000 acre-feet. In terms of flow releases, this volume will provide a year-round BFAA flow release of 30 to 40 cfs, approximately 9 weeks of flow releases at 200 cfs, or approximately 2 weeks of flow releases at 344 cfs. The Fish Passage Working Group will develop detailed protocols for operating the gates and for using BFAA releases to facilitate fish passage as part of an adaptive management effort. The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. The 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[7] offers more detailed information on the proposed adaptive management program.

[7] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

3.1.3 ECOLOGICAL FLOW STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
A	2	Agency Recommendation (see Appendix A of the LIHI Standards for definitions): • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations).

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[8] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14030478

modification, DVWD temporarily released a minimum flow of 30 cfs from the Opal Springs Project and no more than 20 cfs downstream at an existing fish hatchery ladder (non-project) for the purposes of attracting upstream migrating adult salmonids and providing the necessary water supply to the fish hatchery pools located approximately 950 feet downstream of the dam (non-project).

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Update: The OHSP no longer modifies the flows, although the Project has the flexibility for this variance. This may be re-established during construction of the fish ladder.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

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When FERC processes the 2015 Non-Capacity License Amendment (*revised in 2017)*, Article 36 will be modified as noted above and future operations will be conducted as described in the preceding paragraph.

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new period. The 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[11] offers more detailed information on the proposed adaptive management program.

[11] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

3.2 WATER QUALITY STANDARDS

3.2.1 WATER QUALITY STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

In accordance with Section 401 of the Clean Water Act (CWA), DVWD applied on February 29, 2016 for an ODEQ Water Quality Certificate (WQC) to accompany the Project's 2015 Non-Capacity License Amendment Application (*revised 2017)*.[12] On October 26, 2016 (re-issued December 13, 2017), the Oregon Department of Environmental Quality issued the Final 401 Water Quality Certificate (Appendix C), noting the Project was ***not*** a contributing factor to any of the Water Quality criterion used for evaluation:

CRITERION	STANDARD	DEQ EVALUATION
Fungi OAR 340-041-007(10)	*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.*	Water quality in the Project area is clear and free of aquatic growths, including fungi. Project operation under an amended license will not fundamentally alter water management or create conditions which favor the growth of aquatic fungi.

[12] On October 7, 1982 DVWD submitted a water quality certificate application to the ODEQ. Because ODEQ concluded that the issuance of a license for this Project, as conditioned, would not be a major federal action that would significantly affect the quality of the human environment, a water quality certification was not issued with the 1982 Project license.

CRITERION	STANDARD	DEQ EVALUATION
Taste & Odors OAR 340-041-007(11)	*The creation of tastes or odors or toxic or other conditions that are deleterious to fish and other aquatic life or affect the palatability of drinking water or the palatability of fish or shellfish may not be allowed.*	Project operations do not result in objectionable tastes, odors, or conditions which adversely impact the palatability of water, fish, or shellfish. DEQ expects no change to this condition under the amended license.
Sediment OAR 340-041-007(12)	*The formation of bottom or sludge deposits deleterious to habitat and aquatic life are not allowed.*	The Project will not alter sediment transport under the amended license.
Aesthetic conditions OAR 340-041-007(14)	*Aesthetic conditions offensive to human sight, taste, smell or touch may not be allowed.*	The proposed changes to project operation will not fundamentally alter water management. The aesthetic quality of water in the Project area is currently good. DEQ expects no change to this condition under an amended license.
Nuisance Algae Growth OAR 340-041-0019	*Algal growth which impairs the recognized beneficial uses of the water body is not allowed.*	Under the amended license, the residence time of the diversion pool will increase to 1.6 hours. DEQ believes this period is too brief to allow algal communities to proliferate.
Radioisotopes OAR 340-041-007(15)	*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.*	The Project does not utilize, store, or discharge radioactive material. DEQ expects no change to this condition under an amended license.

CRITERION	STANDARD	DEQ EVALUATION
Bacteria OAR 340-041-009	*Limits in-water concentration of bacterial cells, discharge of raw sewage, animal waste runoff, sewer overflows, and other sources of bacterial pollution.*	The Project does not discharge sewage or animal wastes into Project waters or engage in other activities which may contribute to bacterial pollution. DEQ expects no change to this condition under an amended license.
Total Dissolved Gas OAR 340-041-0031	*Protects aquatic life from gas bubble trauma caused by water that is supersaturated with atmospheric gases.*	Bypass reach is characterized by shallow rock conditions and turbulent flow. These conditions do not support entrainment of gases. DEQ expects no change to this condition under an amended license.
Total Dissolved Solids OAR 340-041-0032 & OAR 340-041-0345	*Standard generally prohibits TDS concentrations which exceed basin-specific criterion of 100 mg/l.*	The Project does not contribute organic or inorganic substances in molecular, ionized, or micro-granular form which may affect TDS in Project waters. DEQ expects no change to this condition under an amended license.
Toxic Substances OAR 340-041-0033	*Toxic substances may not be introduced above natural background levels.*	Project does not discharge toxic substances. No actions proposed under an amended license will result in toxic discharge. DEQ expects no change to this condition under an amended license.

Within the ODEQ's Approved 2010 Integrated Water Quality Report, the Lower Crooked River is classified as an impaired waterway (ODEQ 2011b).[13] The OSHP is embedded within a 51-mile segment of the Crooked River (extending upstream from the mouth) that is on Oregon's 303(d) list of streams with impaired water quality.

[13] ODEQ's 2012 Integrated Water Quality Report was submitted to the U.S. Environmental Protection Agency (USEPA) in November 2014 and is awaiting approval.

Deschutes Valley Water District filed an application for a 2015 Non-Capacity License Amendment (*revised 2017*) for the OSHP. The Lower Crooked River is identified on DEQ's 303d list of impaired water bodies as exceeding the range of numeric criteria for pH from RM 29.6 to RM 47.9 and for temperature from RM 0 to RM 51. **DEQ expects the proposed actions will not contribute to the further impairment of these water quality parameters.** To confirm this expectation, DEQ will require Deschutes Valley Water District to conduct water quality monitoring once the facility is functional and engage in adaptive management of the project, as necessary, to ensure that water quality standards are met. The 303(d) listing is due to elevated summer temperatures, elevated E. coli levels, development of aquatic weeds/algae, Ammonia, and high pH in areas well upstream of the OSHP (ODEQ 2011b). ODEQ has determined that pathogens, nutrients, temperature, and caustic conditions contribute to the violation. **The OSHP is not listed as a contributing factor to the violations (USEPA 2016).**

3.2.2 WATER QUALITY STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

In accordance with Section 401 of the Clean Water Act (CWA), DVWD applied on February 29, 2016 for an ODEQ Water Quality Certificate (WQC) to accompany the Project's 2015 Non-Capacity License Amendment Application (*revised 2017)*.[14] On October 26, 2016 (re-issued

[14] On October 7, 1982 DVWD submitted a water quality certificate application to the ODEQ. Because ODEQ concluded that the issuance of a license for this Project, as conditioned, would not be a major federal action that would significantly affect the quality of the human environment, a water quality certification was not issued with the 1982 Project license.

December 13, 2017), the Oregon Department of Environmental Quality issued the Final 401 Water Quality Certificate (Appendix C), noting the Project was *not* a contributing factor to any of the Water Quality criteria used for evaluation.

CRITERION	STANDARD	DEQ EVALUATION
Fungi OAR 340-041-007(10)	*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.*	Water quality in the Project area is clear and free of aquatic growths, including fungi. Project operation under an amended license will not fundamentally alter water management or create conditions which favor the growth of aquatic fungi.
Taste & Odors OAR 340-041-007(11)	*The creation of tastes or odors or toxic or other conditions that are deleterious to fish and other aquatic life or affect the palatability of drinking water or the palatability of fish or shellfish may not be allowed.*	Project operations do not result in objectionable tastes, odors, or conditions which adversely impact the palatability of water, fish, or shellfish. DEQ expects no change to this condition under the amended license.
Sediment OAR 340-041-007(12)	*The formation of bottom or sludge deposits deleterious to habitat and aquatic life are not allowed.*	The Project will not alter sediment transport under the amended license.
Aesthetic conditions OAR 340-041-007(14)	*Aesthetic conditions offensive to human sight, taste, smell or touch may not be allowed.*	The proposed changes to project operation will not fundamentally alter water management. The aesthetic quality of water in the Project area is currently good. DEQ expects no change to this condition under an amended license.

CRITERION	STANDARD	DEQ EVALUATION
Nuisance Algae Growth OAR 340-041-0019	*Algal growth which impairs the recognized beneficial uses of the water body is not allowed.*	Under the amended license, the residence time of the diversion pool will increase to 1.6 hours. DEQ believes this period is too brief to allow algal communities to proliferate.
Radioisotopes OAR 340-041-007(15)	*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.*	The Project does not utilize, store, or discharge radioactive material. DEQ expects no change to this condition under an amended license.
Bacteria OAR 340-041-009	*Limits in-water concentration of bacterial cells, discharge of raw sewage, animal waste runoff, sewer overflows, and other sources of bacterial pollution.*	The Project does not discharge sewage or animal wastes into Project waters or engage in other activities which may contribute to bacterial pollution. DEQ expects no change to this condition under an amended license.
Total Dissolved Gas OAR 340-041-0031	*Protects aquatic life from gas bubble trauma caused by water that is supersaturated with atmospheric gases.*	Bypass reach is characterized by shallow rock conditions and turbulent flow. These conditions do not support entrainment of gases. DEQ expects no change to this condition under an amended license.
Total Dissolved Solids OAR 340-041-0032 & OAR 340-041-0345	*Standard generally prohibits TDS concentrations which exceed basin-specific criterion of 100 mg/l.*	The Project does not contribute organic or inorganic substances in molecular, ionized, or micro-granular form which may affect TDS in Project waters. DEQ expects no change to this condition under an amended license.

CRITERION	STANDARD	DEQ EVALUATION
Toxic Substances OAR 340-041-0033	*Toxic substances may not be introduced above natural background levels.*	Project does not discharge toxic substances. No actions proposed under an amended license will result in toxic discharge. DEQ expects no change to this condition under an amended license.

In anticipation of needing a WQC from ODEQ, DVWD begun collecting data from the OSHP forebay and tailrace. The information below available on water quality in the vicinity of the OSHP comes from multiple sources, including ODEQ, the Bureau of Land Management (BLM), a study by researchers at the U.S. Geological Survey (USGS), and evaluations by consultants to DVWD:

- **Temperature:** Water temperatures at and near the OSHP are cool, moderated by groundwater inflows, and meet the quality criteria established by ODEQ. Continuous records for the USGS gauge on Crooked River less than half a mile downstream of the OSHP (No. 14087400 [Crooked River below Opal Springs, near Culver, Oregon]) show annual peaks in 7-day maximum temperatures ranging from 14.0°C to 14.4°C during 2006 through 2014 (USGS 2016).
- **Dissolved Oxygen:** All measurements that have been taken of dissolved oxygen at or near the OSHP meet ODEQ water quality standards. Measurements taken during the 2011 summer by ODEQ ranged from 9.5 to 10.0 mg/l (ODEQ 2011c).
- **Total Dissolved Gas:** There are no indications that total dissolved gas levels at the OSHP exceed state levels.
- **pH:** Judging from the measured water chemistry of profuse springs discharging into the Crooked River canyon in and above the vicinity of the OSHP, natural pH levels in the area exceed 8 during at least portions of the year but fall within a desired range of 6.5 to 8.5. ODEQ measured pH to be 8.3-8.4 at the OSHP during an afternoon in early August 2005 and recorded mid-morning pH value of 7.9 at the OSHP in late July 2009 (ODEQ 2011c). The ODEQ measurements were within about the same range recorded by USGS researchers examining the Crooked River just above the OSHP diversion pool during 2005. USGS measured pH at 8.0-8.2 on an afternoon in May and at 8.2-8.4 on an August afternoon (M. McSwain, Prineville BLM, pers comm.). The pH values measured by ODEQ and by the USGS are reasonably consistent with data collected by consultants to DVWD during 2011 in and downstream of the OSHP diversion pool. These more recent data suggest that there may be infrequent, brief, and localized exceedances of the Oregon standard for pH at the OSHP associated with seasonally abundant aquatic macrophytes in portions of the OSHP diversion pool.

- **Bacteria (E. coli):** E. coli bacteria are a potential concern along segments of the Crooked River that are a considerable distance upstream from the OSHP. Most potential sources of this contaminant are found above the Highway 97 bridge, E. coli in the river at or above the bridge become diluted by profuse groundwater discharges that occur in the canyon within which the OSHP is located.
- **Nuisance algae:** Water passing through and past the OSHP is very clear during seasons that plankton might bloom, and there are no indications that chlorophyll-a reaches threshold levels at the OSHP.
- **Biocriteria:** There are no indications that water quality at the OSHP is not fully supportive of native aquatic species.

Within the ODEQ's Approved 2010 Integrated Water Quality Report, the Lower Crooked River is classified as an impaired waterway (ODEQ 2011b).[15] The OSHP is embedded within a 51-mile segment of the Crooked River (extending upstream from the mouth) that is on Oregon's 303(d) list of streams with impaired water quality.

Deschutes Valley Water District filed an application for a 2015 Non-Capacity License Amendment (*revised 2017*) for the OSHP. The Lower Crooked River is identified on DEQ's 303d list of impaired water bodies as exceeding the range of numeric criteria for pH from RM 29.6 to RM 47.9 and for temperature from RM 0 to RM 51. **DEQ expects the proposed actions will not contribute to the further impairment of these water quality parameters.** To confirm this expectation, DEQ will require Deschutes Valley Water District to conduct water quality monitoring once the facility is functional and engage in adaptive management of the project, as necessary, to ensure that water quality standards are met. The 303(d) listing is due to elevated summer temperatures, elevated E. coli levels, development of aquatic weeds/algae, Ammonia, and high pH in areas well upstream of the OSHP (ODEQ 2011b). ODEQ has determined that pathogens, nutrients, temperature, and caustic conditions contribute to the violation. **The OSHP is not listed as a contributing factor to the violations (USEPA 2016).**

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3.2.3 WATER QUALITY STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
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Aesthetic conditions OAR 340-041-007(14)	*Aesthetic conditions offensive to human sight, taste, smell or touch may not be allowed.*	The proposed changes to project operation will not fundamentally alter water management. The aesthetic quality of water in the Project area is currently good. DEQ expects no change to this condition under an amended license.
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Radioisotopes OAR 340-041-007(15)	*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.*	The Project does not utilize, store, or discharge radioactive material. DEQ expects no change to this condition under an amended license.

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Total Dissolved Gas OAR 340-041-0031	*Protects aquatic life from gas bubble trauma caused by water that is supersaturated with atmospheric gases.*	Bypass reach is characterized by shallow rock conditions and turbulent flow. These conditions do not support entrainment of gases. DEQ expects no change to this condition under an amended license.
Total Dissolved Solids OAR 340-041-0032 & OAR 340-041-0345	*Standard generally prohibits TDS concentrations which exceed basin-specific criterion of 100 mg/l.*	The Project does not contribute organic or inorganic substances in molecular, ionized, or micro-granular form which may affect TDS in Project waters. DEQ expects no change to this condition under an amended license.
Toxic Substances OAR 340-041-0033	*Toxic substances may not be introduced above natural background levels.*	Project does not discharge toxic substances. No actions proposed under an amended license will result in toxic discharge. DEQ expects no change to this condition under an amended license.

In anticipation of needing a WQC from ODEQ, DVWD begun collecting data from the OSHP forebay and tailrace. The information below available on water quality in the vicinity of the OSHP comes from multiple sources, including ODEQ, the Bureau of Land Management (BLM), a study by researchers at the U.S. Geological Survey (USGS), and evaluations by consultants to DVWD:

- **Temperature:** Water temperatures at and near the OSHP are cool, moderated by groundwater inflows, and meet the quality criteria established by ODEQ. Continuous

records for the USGS gauge on Crooked River less than half a mile downstream of the OSHP (No. 14087400 [Crooked River below Opal Springs, near Culver, Oregon]) show annual peaks in 7-day maximum temperatures ranging from 14.0°C to 14.4°C during 2006 through 2014 (USGS 2016).

- **Dissolved Oxygen:** All measurements that have been taken of dissolved oxygen at or near the OSHP meet ODEQ water quality standards. Measurements taken during the 2011 summer by ODEQ ranged from 9.5 to 10.0 mg/l (ODEQ 2011c).
- **Total Dissolved Gas:** There are no indications that total dissolved gas levels at the OSHP exceed state levels.
- **pH:** Judging from the measured water chemistry of profuse springs discharging into the Crooked River canyon in and above the vicinity of the OSHP, natural pH levels in the area exceed 8 during at least portions of the year but fall within a desired range of 6.5 to 8.5. ODEQ measured pH to be 8.3-8.4 at the OSHP during an afternoon in early August 2005 and recorded mid-morning pH value of 7.9 at the OSHP in late July 2009 (ODEQ 2011c). The ODEQ measurements were within about the same range recorded by USGS researchers examining the Crooked River just above the OSHP diversion pool during 2005. USGS measured pH at 8.0-8.2 on an afternoon in May and at 8.2-8.4 on an August afternoon (M. McSwain, Prineville BLM, pers comm.). The pH values measured by ODEQ and by the USGS are reasonably consistent with data collected by consultants to DVWD during 2011 in and downstream of the OSHP diversion pool. These more recent data suggest that there may be infrequent, brief, and localized exceedances of the Oregon standard for pH at the OSHP associated with seasonally abundant aquatic macrophytes in portions of the OSHP diversion pool.
- **Bacteria (E. coli):** E. coli bacteria are a potential concern along segments of the Crooked River that are a considerable distance upstream from the OSHP. Most potential sources of this contaminant are found above the Highway 97 bridge, E. coli in the river at or above the bridge become diluted by profuse groundwater discharges that occur in the canyon within which the OSHP is located.
- **Nuisance algae:** Water passing through and past the OSHP is very clear during seasons that plankton might bloom, and there are no indications that chlorophyll-a reaches threshold levels at the OSHP.
- **Biocriteria:** There are no indications that water quality at the OSHP is not fully supportive of native aquatic species.

Within the ODEQ's Approved 2010 Integrated Water Quality Report, the Lower Crooked River is classified as an impaired waterway (ODEQ 2011b).[17] The OSHP is embedded within a 51-mile segment of the Crooked River (extending upstream from the mouth) that is on Oregon's 303(d) list of streams with impaired water quality.

[17] ODEQ's 2012 Integrated Water Quality Report was submitted to the U.S. Environmental Protection Agency (USEPA) in November 2014 and is awaiting approval.

Deschutes Valley Water District filed an application for a 2015 Non-Capacity License Amendment (*revised 2017*) for the OSHP. The Lower Crooked River is identified on DEQ's 303d list of impaired water bodies as exceeding the range of numeric criteria for pH from RM 29.6 to RM 47.9 and for temperature from RM 0 to RM 51. **DEQ expects the proposed actions will not contribute to the further impairment of these water quality parameters.** To confirm this expectation, DEQ will require Deschutes Valley Water District to conduct water quality monitoring once the facility is functional and engage in adaptive management of the project, as necessary, to ensure that water quality standards are met. The 303(d) listing is due to elevated summer temperatures, elevated E. coli levels, development of aquatic weeds/algae, Ammonia, and high pH in areas well upstream of the OSHP (ODEQ 2011b). ODEQ has determined that pathogens, nutrients, temperature, and caustic conditions contribute to the violation. **The OSHP is not listed as a contributing factor to the violations (USEPA 2016).**

3.3 UPSTREAM FISH PASSAGE STANDARDS

3.3.1 UPSTREAM FISH PASSAGE STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
C	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

The OSHP was licensed by FERC in 1982 and commissioned in 1985. Previous construction of the downstream PRB Project in the 1960s had resulted in the extirpation of the anadromous spring chinook salmon, sockeye salmon, and summer steelhead trout from the Upper Deschutes Basin; consequently, fish passage was neither required nor provided at the OSHP at the time of licensing. The following migratory and non-migratory fish are found in this riverine reach:

NATIVE ANADROMOUS SPECIES		
COMMON NAME	**SCIENTIFIC NAME**	**IMAGE**
Chinook Salmon (Spring)	*Oncorhynchus tshawytscha*	
Steelhead (Summer)	*Oncorhynchus mykiss*	
Sockeye Salmon (historical presence; not expected to use the ladder)	*Oncorhynchus nerka*	

NON-MIGRATORY SPECIES		
COMMON NAME	**SCIENTIFIC NAME**	**IMAGE**
Native Redband Trout	*Oncorhynchus mykiss gairdneri*	
Bull Trout	*Salvelinus confluentus*	
Mountain Whitefish	*Prosopium williamsoni*	
Brown Trout	*Salmo trutta*	
Sculpin	*Myoxocephalus octodecemspinosus*	
Northern Pikeminnow	*Ptychocheilus oregonensis*	

Current Operations

In 2011, with the installation of anadromous fish passage at the PRB Project in 2007, anadromous fish species were reintroduced into the Crooked River. The passage has also reintroduced Bull Trout, a species listed under the ESA, to the Crooked River. The OSHP is now acting as a barrier for anadromous species movement and as a barrier for the local movement of Bull Trout as the facility sits within classified Bull Trout critical habitat.

In response to a request from the Fish Passage Working Group, DVWD has been voluntarily implementing an interim trap-and-haul effort since 2011.[18] From 2012 to 2014, ODFW utilized an existing non-project hatchery fish ladder located approximately 950 feet downstream of the dam to attract migrating salmon and steelhead to a fish collection chamber. Captured salmon and

[18] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14013783

steelhead are then transported via truck, and released 325 feet upstream from the OSHP dam crest to continue their upstream migration to spawning areas in the Crooked River.

In 2014, the location of the trap was changed, in an effort to improve its trap efficiency. In the 24 months between May 1, 2014, and April 30, 2016, a total of 78 bull trout were captured in the trap. The number of bull trout captured varied from a peak of 18 in May of 2014, to zero in January and February of both 2015 and 2016. In most months from 1 to 6 bull trout were captured. Fish length varied from 280 to 400 mm, though most were in the 300 to 350 mm size range. Previous studies (Pratt, 1992) found that age 3 bull trout range from 191to 299 mm, while age 4 bull trout vary from 299 to 459 mm. This suggests that the bull trout captured at the Project were three to four years old.

Bull trout are not currently passed using the existing trap & haul measures per USFWS Federal Fish and Wildlife Permit TE72084A-0, and agreed to be by all Settlement Agreement Parties as part of the Amendment to Article 36 (see Recovery Permit Application and corresponding Permit TE72084A-0). As stated in the Permit, "bull trout are not the focus of the proposed" trap & haul activity. Upstream of Highway 97 the Crooked River experiences low summer flow and high-water temperatures which are unsuitable for bull trout, though these areas may become suitable during winter months. The only section of the Crooked River currently occupied by bull trout is the one-mile long reach of the river downstream of the Project dam, which is suitable for foraging bull trout all year.

Future Operations under 2015 Non-Capacity License Amendment (revised 2017)

Under the terms of the 2015 Settlement Agreement, DVWD has agreed amongst other things to:

- construct a fish ladder to provide passage into the spawning, rearing, and foraging habitats of the Crooked River;
- establish a water credit system known as the BFAA that will provide for additional water, when needed, to the bypass reach to assist upstream fish passage and /or to assist downstream fish passage;
- implement an M&E program for assessing the performance of the fish passage facilities against Performance Standards; adaptively manage the Project to meet fish passage performance objectives;
- implement the Opal Springs Fish Passage and Protection Plan; and

- provide annual report addressing the activities within the calendar year relating to the fish passage facilities.

In response to submission of DVWD's 2015 Settlement Agreement and Non-Capacity License Amendment, the ODFW, NMFS, and USFWS, issued recommendations, prescriptions, and conditions for the upstream fishway and associated 2015 Settlement Agreement conditions in 2016. The following conditions relate to upstream/downstream fish passage:

- **Once the Project fish ladder begins operation, all migratory fish (including bull trout) will use the ladder to volitionally migrate upstream of the Project. These fish are expected to be foraging subadults and adults that will remain in the Crooked River upstream of the Project for an unknown period of time before passing downstream of the Project. The fish will be attracted to flows in the bypass reach, where the entrance to the ladder is located.**
- Upstream and downstream fish passage monitoring will be implemented in a series of three 5-year Performance Assessment Intervals to help ensure point estimates have an appropriate level of precision and represent a range of environmental conditions. Though data from any one year may trigger implementation of the Agreement's Opal Springs Fish Passage Protection Plan's measures to improve passage effectiveness, assessment of the Performance Objectives will only occur following completion of an entire 5-year Performance Assessment Interval. The Project's compliance with fish passage Performance Objectives will be determined based on point estimates of aggregated data at the end of each 5-year Performance Assessment Interval.
- The Licensee will continuously monitor the upstream passage of adult fish > 12 inches (305 mm) in length through the fish ladder for the term of the Amended License, which expires in 2032. Fish using the ladder will be identified and enumerated using video, electronic counter and/or adult trapping to identify species, passage date, and passage time.
- Regarding downstream passage, the Project Licensee will monitor at least 25 radio-tagged steelhead smolts annually. Data accumulated through annual smolt passage monitoring will be assessed at 5-year intervals to provide a basis for deciding upon needs for additional downstream fish passage improvements at the Project. Percent survival estimates for upstream and downstream migrants will be calculated from the aggregated 5-year telemetry data.

This Non-Capacity License Amendment will positively contribute towards the success of the 2008 Upper Deschutes River Reintroduction and Conservation Plan for Anadromous fish in the Upper Deschutes Sub-basin[19]. The implementation of upstream fish passage at OSHP will reconnect approximately 108 miles of spawning habitat above OSHP. By providing volitional

[19] http://www.winnememwintu.us/wp-content/uploads/2011/09/deschutes_reintro_plan_10-20-08.pdf

upstream passage, salmon and steelhead will be able to move above the OSHP and into historic spawning grounds.

As afore noted, DVWD will instill an Adaptive Management program with the implementation of 2015 Settlement Agreement provisions. Objectives for upstream fish passage facility include the following:

SPECIES	STANDARD (TO BE MET)	GOAL (TO BE STRIVED FOR)
Steelhead and Chinook Salmon adults	≥90% successful upstream passage of migratory adults, with ≥90% of those adults that do successfully pass the Project doing so by a specified date each year. Fish that perish when falling-back after dam passage will be considered unsuccessful migrants.	≥97% successful upstream passage of migratory adults destined for areas above the Project. Fish that perish when falling-back after dam passage will be considered unsuccessful migrants.
Bull trout adults and subadults	≥90% successful upstream passage, with the standard assumed to be met if that for steelhead adults is met at the Project.	≥97% successful upstream passage, with the goal assumed to be met if that for steelhead adults is met at the Project.

The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. Monitoring information will include adult counts through the Project area; adult migration timing; real-time adult passage effectiveness; aggregate adult fish passage performance; juvenile relative abundance; juvenile emigration timing; real-time juvenile passage effectiveness; and aggregate smolt passage performance. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. Please see the 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[20] for more detailed information on the proposed adaptive management program.

[20] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

3.3.2 UPSTREAM FISH PASSAGE STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
C	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

The OSHP was licensed by FERC in 1982 and commissioned in 1985. Previous construction of the downstream PRB Project in the 1960s had resulted in the extirpation of the anadromous spring chinook salmon, sockeye salmon, and summer steelhead trout from the Upper Deschutes Basin; consequently, fish passage was neither required nor provided at the OSHP at the time of licensing. The following migratory and non-migratory fish are found in this riverine reach:

NATIVE ANADROMOUS SPECIES		
COMMON NAME	**SCIENTIFIC NAME**	**IMAGE**
Chinook Salmon (Spring)	*Oncorhynchus tshawytscha*	
Steelhead (Summer)	*Oncorhynchus mykiss*	
Sockeye Salmon (historical presence; not expected to use the ladder)	*Oncorhynchus nerka*	

NON-MIGRATORY SPECIES		
COMMON NAME	**SCIENTIFIC NAME**	**IMAGE**
Native Redband Trout	*Oncorhynchus mykiss gairdneri*	
Bull Trout	*Salvelinus confluentus*	
Mountain Whitefish	*Prosopium williamsoni*	
Brown Trout	*Salmo trutta*	
Sculpin	*Myoxocephalus octodecemspinosus*	
Northern Pikeminnow	*Ptychocheilus oregonensis*	

Current Operations

In 2011, with the installation of anadromous fish passage at the PRB Project in 2007, anadromous fish species were reintroduced into the Crooked River. The passage has also reintroduced Bull Trout, a species listed under the ESA, to the Crooked River. The OSHP is now acting as a barrier for anadromous species movement and as a barrier for the local movement of Bull Trout as the facility sits within classified Bull Trout critical habitat.

In response to a request from the Fish Passage Working Group, DVWD has been voluntarily implementing an interim trap-and-haul effort since 2011.[21] From 2012 to 2014, ODFW utilized an existing non-project hatchery fish ladder located approximately 950 feet downstream of the

[21] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14013783

dam to attract migrating salmon and steelhead to a fish collection chamber. Captured salmon and steelhead are then transported via truck, and released 325 feet upstream from the OSHP dam crest to continue their upstream migration to spawning areas in the Crooked River.

In 2014, the location of the trap was changed, in an effort to improve its trap efficiency. In the 24 months between May 1, 2014, and April 30, 2016, a total of 78 bull trout were captured in the trap. The number of bull trout captured varied from a peak of 18 in May of 2014, to zero in January and February of both 2015 and 2016. In most months from 1 to 6 bull trout were captured. Fish length varied from 280 to 400 mm, though most were in the 300 to 350 mm size range. Previous studies (Pratt, 1992) found that age 3 bull trout range from 191to 299 mm, while age 4 bull trout vary from 299 to 459 mm. This suggests that the bull trout captured at the Project were three to four years old.

Bull trout are not currently passed using the existing trap & haul measures per USFWS Federal Fish and Wildlife Permit TE72084A-0, and agreed to be by all Settlement Agreement Parties as part of the Amendment to Article 36 (see Recovery Permit Application and corresponding Permit TE72084A-0). As stated in the Permit, "bull trout are not the focus of the proposed" trap & haul activity. Upstream of Highway 97 the Crooked River experiences low summer flow and high-water temperatures which are unsuitable for bull trout, though these areas may become suitable during winter months. The only section of the Crooked River currently occupied by bull trout is the one-mile long reach of the river downstream of the Project dam, which is suitable for foraging bull trout all year.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

Under the terms of the 2015 Settlement Agreement, DVWD has agreed amongst other things to:

- construct a fish ladder to provide passage into the spawning, rearing, and foraging habitats of the Crooked River;
- establish a water credit system known as the BFAA that will provide for additional water, when needed, to the bypass reach to assist upstream fish passage and /or to assist downstream fish passage;
- implement an M&E program for assessing the performance of the fish passage facilities against Performance Standards; adaptively manage the Project to meet fish passage performance objectives;
- implement the Opal Springs Fish Passage and Protection Plan; and

- provide annual report addressing the activities within the calendar year relating to the fish passage facilities.

In response to submission of DVWD's 2015 Settlement Agreement and Non-Capacity License Amendment, the ODFW, NMFS, and USFWS, issued recommendations, prescriptions, and conditions for the upstream fishway and associated 2015 Settlement Agreement conditions in 2016. The following conditions relate to upstream/downstream fish passage:

- **Once the Project fish ladder begins operation, all migratory fish (including bull trout) will use the ladder to volitionally migrate upstream of the Project. These fish are expected to be foraging subadults and adults that will remain in the Crooked River upstream of the Project for an unknown period of time before passing downstream of the Project. The fish will be attracted to flows in the bypass reach, where the entrance to the ladder is located.**
- Upstream and downstream fish passage monitoring will be implemented in a series of three 5-year Performance Assessment Intervals to help ensure point estimates have an appropriate level of precision and represent a range of environmental conditions. Though data from any one year may trigger implementation of the Agreement's Opal Springs Fish Passage Protection Plan's measures to improve passage effectiveness, assessment of the Performance Objectives will only occur following completion of an entire 5-year Performance Assessment Interval. The Project's compliance with fish passage Performance Objectives will be determined based on point estimates of aggregated data at the end of each 5-year Performance Assessment Interval.
- The Licensee will continuously monitor the upstream passage of adult fish > 12 inches (305 mm) in length through the fish ladder for the term of the Amended License, which expires in 2032. Fish using the ladder will be identified and enumerated using video, electronic counter and/or adult trapping to identify species, passage date, and passage time.
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This Non-Capacity License Amendment will positively contribute towards the success of the 2008 Upper Deschutes River Reintroduction and Conservation Plan for Anadromous fish in the Upper Deschutes Sub-basin[22]. The implementation of upstream fish passage at OSHP will reconnect approximately 108 miles of spawning habitat above OSHP. By providing volitional

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Bull trout adults and subadults	≥90% successful upstream passage, with the standard assumed to be met if that for steelhead adults is met at the Project.	≥97% successful upstream passage, with the goal assumed to be met if that for steelhead adults is met at the Project.

The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. Monitoring information will include adult counts through the Project area; adult migration timing; real-time adult passage effectiveness; aggregate adult fish passage performance; juvenile relative abundance; juvenile emigration timing; real-time juvenile passage effectiveness; and aggregate smolt passage performance. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. Please see the 2015 Offer of Settlement

Agreement and Application for Non-Capacity Amendment[23] for more detailed information on the proposed adaptive management program.

3.3.3 UPSTREAM FISH PASSAGE STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
C	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

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NATIVE ANADROMOUS SPECIES		
COMMON NAME	**SCIENTIFIC NAME**	**IMAGE**
Sockeye Salmon (historical presence; not expected to use the ladder)	*Oncorhynchus nerka*	

NON-MIGRATORY SPECIES		
COMMON NAME	**SCIENTIFIC NAME**	**IMAGE**
Native Redband Trout	*Oncorhynchus mykiss gairdneri*	
Bull Trout	*Salvelinus confluentus*	
Mountain Whitefish	*Prosopium williamsoni*	
Brown Trout	*Salmo trutta*	
Sculpin	*Myoxocephalus octodecemspinosus*	
Northern Pikeminnow	*Ptychocheilus oregonensis*	

Current Operations

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- establish a water credit system known as the BFAA that will provide for additional water, when needed, to the bypass reach to assist upstream fish passage and /or to assist downstream fish passage;
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- implement the Opal Springs Fish Passage and Protection Plan; and
- provide annual report addressing the activities within the calendar year relating to the fish passage facilities.

In response to submission of DVWD's 2015 Settlement Agreement and Non-Capacity License Amendment, the ODFW, NMFS, and USFWS, issued recommendations, prescriptions, and conditions for the upstream fishway and associated 2015 Settlement Agreement conditions in 2016. While minor modifications to the proposed project were made in 2017, these provisions have not changed. The following conditions relate to upstream/downstream fish passage:

- **Once the Project fish ladder begins operation, all migratory fish (including bull trout) will use the ladder to volitionally migrate upstream of the Project. These fish are expected to be foraging subadults and adults that will remain in the Crooked River upstream of the Project for an unknown period of time before passing downstream of the Project. The fish will be attracted to flows in the bypass reach, where the entrance to the ladder is located.**
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This Non-Capacity License Amendment will positively contribute towards the success of the 2008 Upper Deschutes River Reintroduction and Conservation Plan for Anadromous fish in the Upper Deschutes Sub-basin[25]. The implementation of upstream fish passage at OSHP will reconnect approximately 108 miles of spawning habitat above OSHP. By providing volitional upstream passage, salmon and steelhead will be able to move above the OSHP and into historic spawning grounds.

As afore noted, DVWD will instill an Adaptive Management program with the implementation of 2015 Settlement Agreement provisions. Objectives for upstream fish passage facility include the following:

SPECIES	STANDARD (TO BE MET)	GOAL (TO BE STRIVED FOR)
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Bull trout adults and subadults	≥90% successful upstream passage, with the standard assumed to be met if that for steelhead adults is met at the Project.	≥97% successful upstream passage, with the goal assumed to be met if that for steelhead adults is met at the Project.

The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. Monitoring information will include adult counts through the Project area; adult migration timing; real-time adult passage effectiveness; aggregate adult fish passage performance; juvenile relative abundance; juvenile emigration timing; real-time juvenile passage effectiveness; and aggregate smolt passage performance. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies

[25] http://www.winnememwintu.us/wp-content/uploads/2011/09/deschutes_reintro_plan_10-20-08.pdf

from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. Please see the 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[26] for more detailed information on the proposed adaptive management program.

[26] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

3.4 DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS

3.4.1 DOWNSTREAM FISH PASSAGE STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

Current Operations

During the 1982 OSHP licensing process, downstream fishway prescriptions were not provided for by resource agencies. Downstream migrants are passed through the facility at either the intake or over the diversion dam.

With anadromous fish passage blocked by the downstream PRB Project at the time of OSHP licensing, fish concerns at OSHP in the early 1980s were primarily for loss of passage for resident fish species and mortality from the turbines. CH2M Hill conducted a downstream passage study in the spring of 1982. The study captured 118 fish, of which 48 were trout or kokanee; CH2M Hill estimated annual mortality of 10 salmonid fish from the turbines. On the basis of estimated low fish mortality from fish entering the power facilities, no screens or louvers were required for the diversion. To mitigate possible losses, DVWD has released hatchery chinook salmon and rainbow and brown trout at Opal Springs from 1985 until 2009. Typically, 10,000 rainbow trout were released annually below the OSHP, and brown trout were occasionally raised as well. All fish were fin clipped. Spring chinook salmon were released there in 1985-86. Since 2009, the hatchery at Opal Springs has been rearing summer steelhead from the Pelton Round Butte Hatchery as part of the anadromous fish reintroduction effort.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

Under the terms of the 2015 Settlement Agreement, DVWD has agreed amongst other things to:

- construct a fish ladder to provide passage into the spawning, rearing, and foraging habitats of the Crooked River;
- establish a water credit system known as the BFAA that will provide for additional water, when needed, to the bypass reach to assist upstream fish passage and /or to assist downstream fish passage;
- implement an M&E program for assessing the performance of the fish passage facilities against Performance Standards; adaptively manage the Project to meet fish passage performance objectives;
- implement the Opal Springs Fish Passage and Protection Plan; and
- provide annual report addressing the activities within the calendar year relating to the fish passage facilities.

In response to submission of DVWD's 2015 Settlement Agreement and Non-Capacity License Amendment, the ODFW, NMFS, and USFWS, issued recommendations, prescriptions, and conditions for the upstream fishway and associated 2015 Settlement Agreement conditions in 2016. The following conditions relate to upstream/downstream fish passage:

- Once the Project fish ladder begins operation, all migratory fish (including bull trout) will use the ladder to volitionally migrate upstream of the Project. These fish are expected to be foraging subadults and adults **that will remain in the Crooked River upstream of the Project for an unknown period of time before passing downstream of the Project. The fish will use the downstream smooth chute to re-enter the bypass reach, and continue downstream.**
- Upstream and downstream fish passage monitoring will be implemented in a series of three 5-year Performance Assessment Intervals to help ensure point estimates have an appropriate level of precision and represent a range of environmental conditions. Though data from any one year may trigger implementation of the Agreement's Opal Springs Fish Passage Protection Plan's measures to improve passage effectiveness, assessment of the Performance Objectives will only occur following completion of an entire 5-year Performance Assessment Interval. The Project's compliance with fish passage Performance Objectives will be determined based on point estimates of aggregated data at the end of each 5-year Performance Assessment Interval.
- The Licensee will continuously monitor the upstream passage of adult fish > 12 inches (305 mm) in length through the fish ladder for the term of the Amended License, which expires in 2032. Fish using the ladder will be identified and enumerated using video, electronic counter and/or adult trapping to identify species, passage date, and passage time.

- Regarding downstream passage, the Project Licensee will monitor at least 25 radio-tagged steelhead smolts annually. Data accumulated through annual smolt passage monitoring will be assessed at 5-year intervals to provide a basis for deciding upon needs for additional downstream fish passage improvements at the Project. Percent survival estimates for upstream and downstream migrants will be calculated from the aggregated 5-year telemetry data.

This Non-Capacity License Amendment will positively contribute towards the success of the 2008 Upper Deschutes River Reintroduction and Conservation Plan for Anadromous fish in the Upper Deschutes Sub-basin[27]. The implementation of upstream fish passage at OSHP will reconnect approximately 108 miles of spawning habitat above OSHP. By providing volitional upstream passage, salmon and steelhead will be able to move above the OSHP and into historic spawning grounds.

SPECIES	STANDARD	GOAL
Steelhead and Chinook Salmon smolts	≥90% passage survival	≥97% passage survival
Bull trout adults and subadults	Assumed to be met if the ≥90% passage survival standard for steelhead smolts is met and levels of upstream passage by bull trout >12" at the Project do not exceed 1,000 fish on an annual basis.	Assumed to be met if the ≥97% goal for steelhead smolts is met.

As afore noted, DVWD will instill an Adaptive Management program with the implementation of 2015 Settlement Agreement provisions. Objectives for downstream fish passage include the following:

The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. Monitoring information will include adult counts through the Project area; adult migration

[27] http://www.winnememwintu.us/wp-content/uploads/2011/09/deschutes_reintro_plan_10-20-08.pdf

timing; real-time adult passage effectiveness; aggregate adult fish passage performance; juvenile relative abundance; juvenile emigration timing; real-time juvenile passage effectiveness; and aggregate smolt passage performance. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. Please see the 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[28] for more detailed information on the proposed adaptive management program.

3.4.2 DOWNSTREAM FISH PASSAGE STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

Current Operations

During the 1982 OSHP licensing process, downstream fishway prescriptions were not provided for by resource agencies. Downstream migrants are passed through the facility at either the intake or over the diversion dam.

With anadromous fish passage blocked by the downstream PRB Project at the time of OSHP licensing, fish concerns at OSHP in the early 1980s were primarily for loss of passage for resident fish species and mortality from the turbines. CH2M Hill conducted a downstream

[28] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

passage study in the spring of 1982. The study captured 118 fish, of which 48 were trout or kokanee; CH2M Hill estimated annual mortality of 10 salmonid fish from the turbines. On the basis of estimated low fish mortality from fish entering the power facilities, no screens or louvers were required for the diversion. To mitigate possible losses, DVWD has released hatchery chinook salmon and rainbow and brown trout at Opal Springs from 1985 until 2009. Typically, 10,000 rainbow trout were released annually below the OSHP, and brown trout were occasionally raised as well. All fish were fin clipped. Spring chinook salmon were released there in 1985-86. Since 2009, the hatchery at Opal Springs has been rearing summer steelhead from the Pelton Round Butte Hatchery as part of the anadromous fish reintroduction effort.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

Under the terms of the 2015 Settlement Agreement, DVWD has agreed amongst other things to:

- construct a fish ladder to provide passage into the spawning, rearing, and foraging habitats of the Crooked River;
- establish a water credit system known as the BFAA that will provide for additional water, when needed, to the bypass reach to assist upstream fish passage and /or to assist downstream fish passage;
- implement an M&E program for assessing the performance of the fish passage facilities against Performance Standards; adaptively manage the Project to meet fish passage performance objectives;
- implement the Opal Springs Fish Passage and Protection Plan; and
- provide annual report addressing the activities within the calendar year relating to the fish passage facilities.

In response to submission of DVWD's 2015 Settlement Agreement and Non-Capacity License Amendment, the ODFW, NMFS, and USFWS, issued recommendations, prescriptions, and conditions for the upstream fishway and associated 2015 Settlement Agreement conditions in 2016. The following conditions relate to upstream/downstream fish passage:

- Once the Project fish ladder begins operation, all migratory fish (including bull trout) will use the ladder to volitionally migrate upstream of the Project. These fish are expected to be foraging subadults and adults **that will remain in the Crooked River upstream of the Project for an unknown period of time before passing downstream of the Project. The fish will use the downstream smooth chute to re-enter the bypass reach, and continue downstream.**

- Upstream and downstream fish passage monitoring will be implemented in a series of three 5-year Performance Assessment Intervals to help ensure point estimates have an appropriate level of precision and represent a range of environmental conditions. Though data from any one year may trigger implementation of the Agreement's Opal Springs Fish Passage Protection Plan's measures to improve passage effectiveness, assessment of the Performance Objectives will only occur following completion of an entire 5-year Performance Assessment Interval. The Project's compliance with fish passage Performance Objectives will be determined based on point estimates of aggregated data at the end of each 5-year Performance Assessment Interval.
- The Licensee will continuously monitor the upstream passage of adult fish > 12 inches (305 mm) in length through the fish ladder for the term of the Amended License, which expires in 2032. Fish using the ladder will be identified and enumerated using video, electronic counter and/or adult trapping to identify species, passage date, and passage time. Regarding downstream passage, the Project Licensee will monitor at least 25 radio-tagged steelhead smolts annually. Data accumulated through annual smolt passage monitoring will be assessed at 5-year intervals to provide a basis for deciding upon needs for additional downstream fish passage improvements at the Project. Percent survival estimates for upstream and downstream migrants will be calculated from the aggregated 5-year telemetry data.

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The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. Monitoring information will include adult counts through the Project area; adult migration

timing; real-time adult passage effectiveness; aggregate adult fish passage performance; juvenile relative abundance; juvenile emigration timing; real-time juvenile passage effectiveness; and aggregate smolt passage performance. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. Please see the 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[29] for more detailed information on the proposed adaptive management program.

3.4.3 DOWNSTREAM FISH PASSAGE STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

Current Operations

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[29] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

passage study in the spring of 1982. The study captured 118 fish, of which 48 were trout or kokanee; CH2M Hill estimated annual mortality of 10 salmonid fish from the turbines. On the basis of estimated low fish mortality from fish entering the power facilities, no screens or louvers were required for the diversion. To mitigate possible losses, DVWD has released hatchery chinook salmon and rainbow and brown trout at Opal Springs from 1985 until 2009. Typically, 10,000 rainbow trout were released annually below the OSHP, and brown trout were occasionally raised as well. All fish were fin clipped. Spring chinook salmon were released there in 1985-86. Since 2009, the hatchery at Opal Springs has been rearing summer steelhead from the Pelton Round Butte Hatchery as part of the anadromous fish reintroduction effort.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

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- Upstream and downstream fish passage monitoring will be implemented in a series of three 5-year Performance Assessment Intervals to help ensure point estimates have an appropriate level of precision and represent a range of environmental conditions. Though data from any one year may trigger implementation of the Agreement's Opal Springs Fish Passage Protection Plan's measures to improve passage effectiveness, assessment of the Performance Objectives will only occur following completion of an entire 5-year Performance Assessment Interval. The Project's compliance with fish passage Performance Objectives will be determined based on point estimates of aggregated data at the end of each 5-year Performance Assessment Interval.
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The adaptive management effort will be implemented through a series of three 5-year periods in which fish passage performance would be evaluated against agreed upon performance targets. Monitoring information will include adult counts through the Project area; adult migration

timing; real-time adult passage effectiveness; aggregate adult fish passage performance; juvenile relative abundance; juvenile emigration timing; real-time juvenile passage effectiveness; and aggregate smolt passage performance. At the end of each period, monitoring data accumulated over the period will be used to identify possible fish passage problems and to identify remedies from a specified suite of potential actions. Remedies will be selected and applied, where appropriate, prior to the initiation of each new period. Please see the 2015 Offer of Settlement Agreement and Application for Non-Capacity Amendment[30] for more detailed information on the proposed adaptive management program.

[30] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

3.5 SHORELINE AND WATERSHED PROTECTION STANDARDS

3.5.1 SHORELINE AND WATERSHED PROTECTION STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

Current Operations

The Project has a small boundary area that incorporates only lands and facilities necessary for Project operations. Shoreline surrounding the project is extremely sloped with cliffs and is made up entirely of scrub/shrub and open water land cover.[31] See Figure 4.

[31] http://www.mrlc.gov/viewerjs/

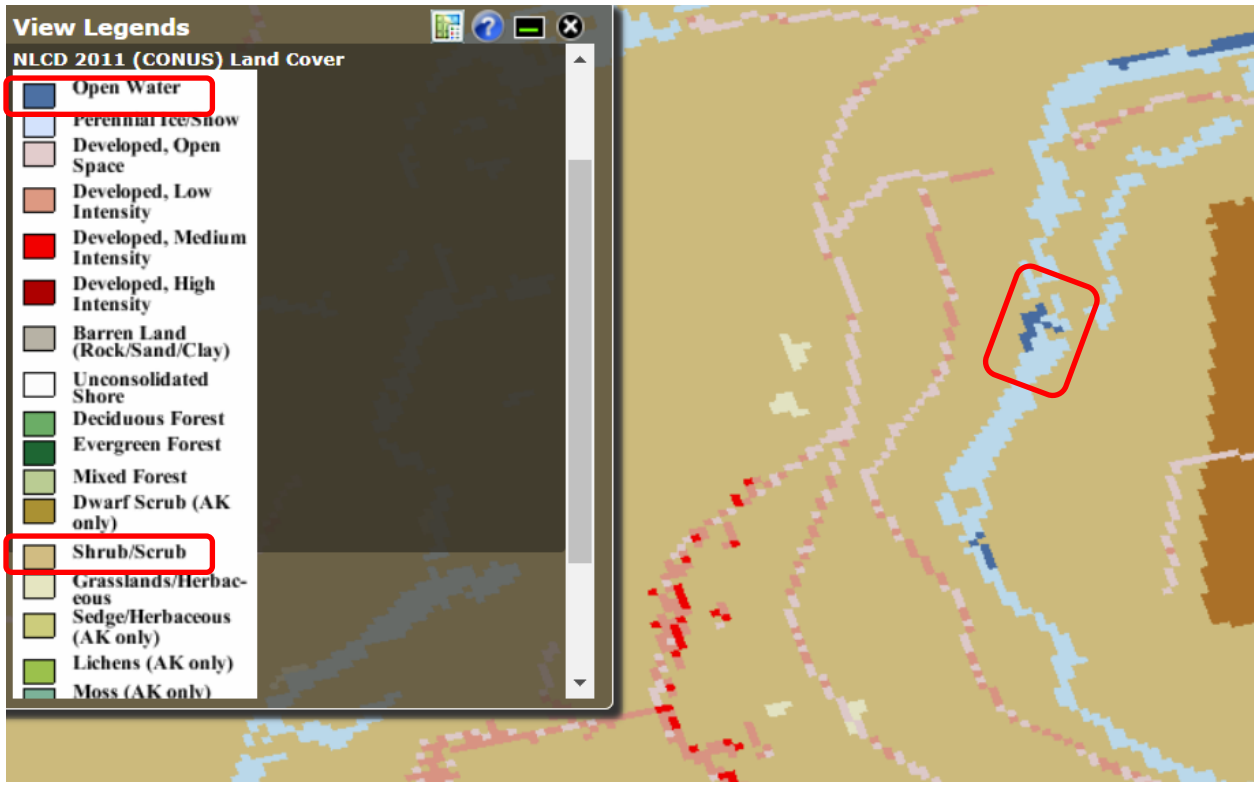

FIGURE 4 NATIONAL LAND COVER DATABASE SHOWING LAND COVER TYPE OF OSHP AS SHRUB/SCRUB AND OPEN WATER

Please see the 1982 Project license and 2015 Settlement Agreement for documentation confirming that a Shoreline Management Plan is not required for this Project.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

As required for removal fill permitting for DSL and USACE, DVWD had a wetland survey completed in 2014. The purpose was to determine and establish the presence and location of Jurisdictional Wetlands along the shorelines of the OSHP. It was found that the area of wetlands that would be inundated as a result of the survey would be 0.018 acre.

Shoreline surrounding the project is extremely sloped with cliffs and is made up entirely of scrub/shrub and open water land cover types. The primary substrate inundated is composed of basalt cliffs. Under the FERC Amendment for the proposed action, the project impoundment will be raised 3 feet inundating approximately 0.018 acre of riverine habitat. Wetland habitats represent .042 acre and water habitats represent 11.1 acres of 110 acres delineated for Biological Assessment. Water quality conditions will be altered minimally during construction of the fish ladder and pool raise. No listed plants or animal species will be affected. 0.188 surface acre will

be removed below the Ordinary High-Water Line, and 0.246 surface acre will be filled under the proposed action.

The wetlands at OSHP provide relatively little support of characteristic vegetation, largely due to their small sizes and limited growth season. In addition, herbaceous vegetation is typically a mix of natives and non-natives, with the sites not particularly supportive of native vegetation exclusively.

Overall, these wetland functions will be temporally reduced as a result of permanent inundation of these wetlands. However, it is likely that over time new accumulations of alluvial material will develop and potentially support new wetland communities to similar levels of pre-project conditions. This may result in natural restoration of at least some of these fish and wildlife functions and vegetation functions over time that will undoubtedly diversify over time in response to the increased connectivity provided by the fish ladder.

There are currently no operational procedures that minimize the tailrace and downstream impacts on shoreline conditions.

3.5.2 SHORELINE AND WATERSHED PROTECTION STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

Current Operations

The Project has a small boundary area that incorporates only lands and facilities necessary for Project operations. Shoreline surrounding the project is extremely sloped with cliffs and is made

up of scrub/shrub land cover[32].

Please see the 1982 Project license and 2015 Settlement Agreement for documentation confirming that a Shoreline Management Plan is not required for this Project.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

As required for removal fill permitting for DSL and USACE, DVWD had a wetland survey completed in 2014. The purpose was to determine and establish the presence and location of Jurisdictional Wetlands along the shorelines of the OSHP. It was found that the area of wetlands that would be inundated as a result of the survey would be 0.018 acre.

Shoreline surrounding the project is extremely sloped with cliffs and is made up entirely of scrub/shrub and open water land cover types. The primary substrate inundated is composed of basalt cliffs. Under the FERC Amendment for the proposed action, the project impoundment will be raised 3 feet inundating approximately 0.018 acre of riverine habitat. Wetland habitats represent .042 acre and water habitats represent 11.1 acres of 110 acres delineated for Biological Assessment. Water quality conditions will be altered minimally during construction of the fish ladder and pool raise. No listed plants or animal species will be affected. 0.188 surface acre will be removed below the Ordinary High-Water Line, and 0.246 surface acre will be filled under the proposed action.

The wetlands at OSHP provide relatively little support of characteristic vegetation, largely due to their small sizes and limited growth season. In addition, herbaceous vegetation is typically a mix of natives and non-natives, with the sites not particularly supportive of native vegetation exclusively.

Overall, these wetland functions will be temporally reduced as a result of permanent inundation of these wetlands. However, it is likely that over time new accumulations of alluvial material will develop and potentially support new wetland communities to similar levels of pre-project conditions. This may result in natural restoration of at least some of these fish and wildlife

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functions and vegetation functions over time that will undoubtedly diversify over time in response to the increased connectivity provided by the fish ladder.

There are currently no operational procedures that minimize the tailrace and downstream impacts on shoreline conditions.

3.5.3 SHORELINE AND WATERSHED PROTECTION STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

Current Operations

The Project has a small boundary area that incorporates only lands and facilities necessary for Project operations. Shoreline surrounding the project is extremely sloped with cliffs and is made up of scrub/shrub land cover[33].

Please see the 1982 Project license and 2015 Settlement Agreement for documentation confirming that a Shoreline Management Plan is not required for this Project.

Future Operations under 2015 Non-Capacity License Amendment (revised in 2017)

As required for removal fill permitting for DSL and USACE, DVWD had a wetland survey completed in 2014. The purpose was to determine and establish the presence and location of Jurisdictional Wetlands along the shorelines of the OSHP. It was found that the area of wetlands that would be inundated as a result of the survey would be 0.018 acre.

Shoreline surrounding the project is extremely sloped with cliffs and is made up entirely of scrub/shrub and open water land cover types. The primary substrate inundated is composed of basalt cliffs. Under the FERC Amendment for the proposed action, the project impoundment will

[33] http://www.mrlc.gov/viewerjs/

be raised 3 feet inundating approximately 0.018 acre of riverine habitat. Wetland habitats represent .042 acre and water habitats represent 11.1 acres of 110 acres delineated for Biological Assessment. Water quality conditions will be altered minimally during construction of the fish ladder and pool raise. No listed plants or animal species will be affected. 0.188 surface acre will be removed below the Ordinary High-Water Line, and 0.246 surface acre will be filled under the proposed action.

The wetlands at OSHP provide relatively little support of characteristic vegetation, largely due to their small sizes and limited growth season. In addition, herbaceous vegetation is typically a mix of natives and non-natives, with the sites not particularly supportive of native vegetation exclusively.

Overall, these wetland functions will be temporally reduced as a result of permanent inundation of these wetlands. However, it is likely that over time new accumulations of alluvial material will develop and potentially support new wetland communities to similar levels of pre-project conditions. This may result in natural restoration of at least some of these fish and wildlife functions and vegetation functions over time that will undoubtedly diversify over time in response to the increased connectivity provided by the fish ladder.

There are currently no operational procedures that minimize the tailrace and downstream impacts on shoreline conditions.

3.6 THREATENED AND ENDANGERED SPECIES STANDARDS

3.6.1 THREATENED AND ENDANGERED SPECIES STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
F	3	Recovery Planning and Action: • If listed species are present, document that the facility is in compliance with relevant conditions in the species recovery plans, incidental take permits or statements, biological opinions, habitat conservation plans, or similar government documents. • Document that any incidental take permits and/or biological opinions currently in effect were designed as long-term solutions for protection of listed species in the area.

As noted in the 2015 Applicant Prepared Environmental Assessment (APEA)[34], the USFWS, NMFS, and ODFW have identified threatened and endangered species in Jefferson County (USFWS 2015). Agencies have identified four species of which are classified as federally threatened under the ESA: Canada Lynx, Northern Spotted Owl, Steelhead, and the Bull Trout.

As afore noted, the OSHP was licensed by FERC in 1982 and commissioned in 1985. Previous construction of the downstream PRB Project in the 1960s had resulted in the extirpation of the anadromous spring chinook salmon, sockeye salmon, and summer steelhead trout from the Upper Deschutes Basin; consequently, fish passage was neither required nor provided at the OSHP at the time of licensing.

In 2011, with the installation of anadromous fish passage at the PRB Project in 2007, anadromous fish species were reintroduced into the Crooked River. The passage has also reintroduced Bull Trout, a species listed under the ESA, to the Crooked River. The OSHP is now acting as a barrier for anadromous species movement and as a barrier for the local movement of Bull Trout as the facility sits within classified Bull Trout critical habitat.

The USFWS adopted a 2011 recovery plan for Northern Spotted Owl[35] and a 2015 recovery plan for Bull Trout[36], and NMFS adopted a 2009 recovery plan for the Middle Columbia River

[34] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909
[35] https://www.fws.gov/oregonfwo/documents/RecoveryPlans/NSO_RevisedRP_2011.pdf
[36] http://www.fws.gov/pacific/bulltrout/pdf/Final_Bull_Trout_Recovery_Plan_092915.pdf

Steelhead[37]. Additionally, the USFWS plans to complete a Canada Lynx Recovery Plan in 2011[38].

The OSHP is situated within designated critical habitat for Bull Trout and historic habitat for Steelhead. DVWD therefore works closely with Resource Agencies so to stay within the parameters of these recovery plans. Under the 2015 Non-Capacity License Amendment, DVWD proposes to install upstream fish passage at the dam, enhance downstream fish passage facilities, implement a fish passage and protection plan, conduct fish passage monitoring and data collection, and implement adaptive management strategies. With the implementation of this amendment and its components, the Project will operate in compliance with Bull Trout Recovery Plan and Steelhead Recovery Plan goals to restore riverine connectivity/historic habitat, implement monitoring to minimize data gaps, and implement collaborative adaptive management strategies.

The OSHP does not reside within classified Spotted Owl critical habitat and DVWD has not identified Spotted Owl activity in the project area. DVWD will continue to maintain an open dialogue with regulatory agencies so to manage Project operations such that they continue to meet recovery goals for this species.

Within the USFWS May 31, 2016, Biological Opinion[39], it was concluded that the 2015 Non-Capacity License Amendment consists of conservation measures that benefit or promote the recovery of listed species. The USFWS concluded after reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed Non-Capacity License Amendment and the cumulative effects, that the proposed action is not likely to jeopardize the continued existence of the bull trout and is not likely to destroy or adversely modify designated critical habitat. The USFWS anticipates that incidental take will occur in the form of harassment, injury, or mortality. The USFWS anticipates that during Project construction, up to 40 subadult and adult bull trout may be harassed annually due to brief, non-lethal water quality effects that result from Project construction activities, and which impair essential behavioral patterns such as feeding and sheltering. USFWS also anticipates that during Project operations, up to 33 percent

[37] http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/middle_columbia/middle_columbia_river_steelhead_recovery_plan.html
[38] https://www.fws.gov/oregonfwo/documents/RecoveryPlans/NSO_RevisedRP_2011.pdf
[39] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14464885

of subadult and adult bull trout that pass upstream of the Project may be killed annually due to downstream passage through the Project turbine or spillways.

As noted within the 2015 Applicant Prepared Environmental Assessment (APEA)[40] (adopted by the Commission on April 6, 2016,[41] without modification), BLM personnel visited the OSHP area in 2010. Except for the fish species identified, the BLM observed no instances of threatened and endangered species in the OSPH area (J. Eisner, BLM, Prineville Office, personal communication), nor do any site-specific reports identify occurrences. It is therefore understood that current operations of the OSHP do not negatively affect Canada Lynx or the Spotted Owl. Future construction activities or operations of the new fish passage facility are also not anticipated to negatively affect these species in the long run.

3.6.2 THREATENED AND ENDANGERED SPECIES STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
F	3	Recovery Planning and Action: • If listed species are present, document that the facility is in compliance with relevant conditions in the species recovery plans, incidental take permits or statements, biological opinions, habitat conservation plans, or similar government documents. • Document that any incidental take permits and/or biological opinions currently in effect were designed as long-term solutions for protection of listed species in the area.

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[40] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909
[41] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14445918
[42] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

Upper Deschutes Basin; consequently, fish passage was neither required nor provided at the OSHP at the time of licensing.

In 2011, with the installation of anadromous fish passage at the PRB Project in 2007, anadromous fish species were reintroduced into the Crooked River. The passage has also reintroduced Bull Trout, a species listed under the ESA, to the Crooked River. The OSHP is now acting as a barrier for anadromous species movement and as a barrier for the local movement of Bull Trout as the facility sits within classified Bull Trout critical habitat.

The USFWS adopted a 2011 recovery plan for Northern Spotted Owl[43] and a 2015 recovery plan for Bull Trout[44], and NMFS adopted a 2009 recovery plan for the Middle Columbia River Steelhead[45]. Additionally, the USFWS plans to complete a Canada Lynx Recovery Plan in 2011[46].

The OSHP is situated within designated critical habitat for Bull Trout and historic habitat for Steelhead. DVWD therefore works closely with Resource Agencies so to stay within the parameters of these recovery plans. Under the 2015 Non-Capacity License Amendment, DVWD proposes to install upstream fish passage at the dam, enhance downstream fish passage facilities, implement a fish passage and protection plan, conduct fish passage monitoring and data collection, and implement adaptive management strategies. With the implementation of this amendment and its components, the Project will operate in compliance with Bull Trout Recovery Plan and Steelhead Recovery Plan goals to restore riverine connectivity/historic habitat, implement monitoring to minimize data gaps, and implement collaborative adaptive management strategies.

The OSHP does not reside within classified Spotted Owl critical habitat and DVWD has not identified Spotted Owl activity in the project area. DVWD will continue to maintain an open dialogue with regulatory agencies so to manage Project operations such that they continue to meet recovery goals for this species.

[43] https://www.fws.gov/oregonfwo/documents/RecoveryPlans/NSO_RevisedRP_2011.pdf
[44] http://www.fws.gov/pacific/bulltrout/pdf/Final_Bull_Trout_Recovery_Plan_092915.pdf
[45] http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/middle_columbia/middle_columbia_river_steelhead_recovery_plan.html
[46] https://www.fws.gov/oregonfwo/documents/RecoveryPlans/NSO_RevisedRP_2011.pdf

Within the USFWS May 31, 2016, Biological Opinion[47], it was concluded that the 2015 Non-Capacity License Amendment consists of conservation measures that benefit or promote the recovery of listed species. The USFWS concluded after reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed Non-Capacity License Amendment and the cumulative effects, that the proposed action is not likely to jeopardize the continued existence of the bull trout and is not likely to destroy or adversely modify designated critical habitat. The USFWS anticipates that incidental take will occur in the form of harassment, injury, or mortality. The USFWS anticipates that during Project construction, up to 40 subadult and adult bull trout may be harassed annually due to brief, non-lethal water quality effects that result from Project construction activities, and which impair essential behavioral patterns such as feeding and sheltering. USFWS also anticipates that during Project operations, up to 33 percent of subadult and adult bull trout that pass upstream of the Project may be killed annually due to downstream passage through the Project turbine or spillways.

As noted within the 2015 Applicant Prepared Environmental Assessment (APEA)[48] (adopted by the Commission on April 6, 2016,[49] without modification), BLM personnel visited the OSHP area in 2010. Except for the fish species identified, the BLM observed no instances of threatened and endangered species in the OSPH area (J. Eisner, BLM, Prineville Office, personal communication), nor do any site-specific reports identify occurrences. It is therefore understood that current operations of the OSHP do not negatively affect Canada Lynx or the Spotted Owl. Future construction activities or operations of the new fish passage facility are also not anticipated to negatively affect these species in the long run.

The NMFS has completed conducting Endangered Species Act Section 7 consultation for anadromous species[50].

[47] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14464885
[48] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909
[49] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14445918
[50] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14796619

3.6.3 THREATENED AND ENDANGERED SPECIES STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
F	3	Recovery Planning and Action: • If listed species are present, document that the facility is in compliance with relevant conditions in the species recovery plans, incidental take permits or statements, biological opinions, habitat conservation plans, or similar government documents. • Document that any incidental take permits and/or biological opinions currently in effect were designed as long-term solutions for protection of listed species in the area.

As noted in the 2015 Applicant Prepared Environmental Assessment (APEA)[51], the USFWS, NMFS, and ODFW have identified threatened and endangered species in Jefferson County (USFWS 2015). Agencies have identified four species of which are classified as federally threatened under the ESA: Canada Lynx, Northern Spotted Owl, Steelhead, and the Bull Trout.

As noted, the OSHP was licensed by FERC in 1982 and commissioned in 1985. Previous construction of the downstream PRB Project in the 1960s had resulted in the extirpation of the anadromous spring chinook salmon, sockeye salmon, and summer steelhead trout from the Upper Deschutes Basin; consequently, fish passage was neither required nor provided at the OSHP at the time of licensing.

In 2011, with the installation of anadromous fish passage at the PRB Project in 2007, anadromous fish species were reintroduced into the Crooked River. The passage has also reintroduced Bull Trout, a species listed under the ESA, to the Crooked River. The OSHP is now acting as a barrier for anadromous species movement and as a barrier for the local movement of Bull Trout as the facility sits within classified Bull Trout critical habitat.

The USFWS adopted a 2011 recovery plan for Northern Spotted Owl[52] and a 2015 recovery plan for Bull Trout[53], and NMFS adopted a 2009 recovery plan for the Middle Columbia River

[51] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909
[52] https://www.fws.gov/oregonfwo/documents/RecoveryPlans/NSO_RevisedRP_2011.pdf
[53] http://www.fws.gov/pacific/bulltrout/pdf/Final_Bull_Trout_Recovery_Plan_092915.pdf

Steelhead[54]. Additionally, the USFWS plans to complete a Canada Lynx Recovery Plan in 2011[55].

The OSHP is situated within designated critical habitat for Bull Trout and historic habitat for Steelhead. DVWD therefore works closely with Resource Agencies so to stay within the parameters of these recovery plans. Under the 2015 Non-Capacity License Amendment, DVWD proposes to install upstream fish passage at the dam, enhance downstream fish passage facilities, implement a fish passage and protection plan, conduct fish passage monitoring and data collection, and implement adaptive management strategies. With the implementation of this amendment and its components, the Project will operate in compliance with Bull Trout Recovery Plan and Steelhead Recovery Plan goals to restore riverine connectivity/historic habitat, implement monitoring to minimize data gaps, and implement collaborative adaptive management strategies.

The OSHP does not reside within classified Spotted Owl critical habitat and DVWD has not identified Spotted Owl activity in the project area. DVWD will continue to maintain an open dialogue with regulatory agencies so to manage Project operations such that they continue to meet recovery goals for this species.

Within the USFWS May 31, 2016, Biological Opinion[56], it was concluded that the 2015 Non-Capacity License Amendment consists of conservation measures that benefit or promote the recovery of listed species. The USFWS concluded after reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed Non-Capacity License Amendment and the cumulative effects, that the proposed action is not likely to jeopardize the continued existence of the bull trout and is not likely to destroy or adversely modify designated critical habitat. The USFWS anticipates that incidental take will occur in the form of harassment, injury, or mortality. The USFWS anticipates that during Project construction, up to 40 subadult and adult bull trout may be harassed annually due to brief, non-lethal water quality effects that result from Project construction activities, and which impair essential behavioral patterns such as feeding and sheltering. USFWS also anticipates that during Project operations, up to 33 percent

[54] http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/middle_columbia/middle_columbia_river_steelhead_recovery_plan.html
[55] https://www.fws.gov/oregonfwo/documents/RecoveryPlans/NSO_RevisedRP_2011.pdf
[56] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14464885

of subadult and adult bull trout that pass upstream of the Project may be killed annually due to downstream passage through the Project turbine or spillways.

As noted within the 2015 Applicant Prepared Environmental Assessment (APEA)[57] (adopted by the Commission on April 6, 2016,[58] without modification), BLM personnel visited the OSHP area in 2010. Except for the fish species identified, the BLM observed no instances of threatened and endangered species in the OSPH area (J. Eisner, BLM, Prineville Office, personal communication), nor do any site-specific reports identify occurrences. It is therefore understood that current operations of the OSHP do not negatively affect Canada Lynx or the Spotted Owl. Future construction activities or operations of the new fish passage facility are also not anticipated to negatively affect these species in the long run.

The NMFS has completed conducting Endangered Species Act Section 7 consultation for anadromous species[59].

[57] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909
[58] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14445918
[59] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14796619

3.7 CULTURAL AND HISTORIC RESOURCES STANDARDS

3.7.1 CULTURAL AND HISTORIC RESOURCES STANDARDS – IMPOUNDMENT/ BYPASS REACH/TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
G	1	Not Applicable / De Minimis Effect: • Document that there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility. • Document that the facility construction and operation have not in the past adversely affected any cultural or historic resources that are present on facility lands.

During the construction of the OSHP, DVWD did not uncover any previously unrecorded archaeological or historical sites and consultation with the State Historic Preservation Office (SHPO) was not required. As stated within the Project's 2001 Environmental Inspection Report[60], because the Project is located in an isolated canyon area of the Crooked River where human access was extremely difficult before the access road was constructed, archaeological and historical artifacts are extremely rare or non-existent. This conclusion is additionally reinforced by the August 10, 2009 BLM cultural resources survey conducted in the OSHP Area of Potential Effects (APE) (Griffin 2009) (included in Exhibit C of the APEA[61]). The survey results indicate that there are no cultural resource sites or isolates in the OSHP area, and as a result, no eligibility or protection recommendations were made by the BLM.

The DVWD has consulted with the SHPO regarding the 2015 Non-Capacity License Amendment Application. On November 13, 2009, the SHPO concurred with the BLM's determination of No Historic Properties Affected for the Opal Springs Fish Passage Improvement Project (included in Exhibit C of the APEA[62]).

[60] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2189320
[61] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909
[62] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14385909

3.8 RECREATIONAL RESOURCES STANDARDS

3.8.1 RECREATIONAL RESOURCE STANDARDS – IMPOUNDMENT

CRITERION	STANDARD	INSTRUCTIONS
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

The segment of the lower Crooked River from RM 17.8 downstream to RM 8 is a federally designated Wild and Scenic River, with identified Outstandingly Resource Values that include recreation (USDI 1992). The Crooked River Wild and Scenic area is readily accessible and provides a variety of year-round recreation opportunities, including fishing, hiking, camping, hunting, photography, wildlife viewing, and boating (USDI BLM 1992). A survey conducted by the BLM indicated that the area received 29,750 visits annually in the early 1990s (BLM and BOR 1992), a level that probably has increased as the human population has expanded in the region. Angling is the primary recreational activity, particularly for native redband trout and mountain whitefish. Camping at group campgrounds as well as at dispersed sites is a popular activity. The area's recreational opportunities are well advertised through the State Scenic Highway and National Back Country Byway publications (USDI BLM 1992). The OSHP lies within an approximately 27-mile segment of the Crooked River used for whitewater kayaking, and recreational fishing takes place within the OSHP vicinity. A boat ramp exists in the reservoir to allow safe transit past the dam.

PHOTO 1 WARNING SIGN TO AID BOATERS IN SAFE TRANSIT PAST THE OSHP FACILITIES

There are no specific recreation plans or license requirements for recreation facilities at OSHP, however the Project is subject to 18 C.F.R. Part 8 requirements and Article 18 of FERC's Terms and Conditions, and therefore, DVWD must provide recreation signage and postings as well as free public access to Project waters and adjacent lands (see Photo 1). The 2001[63] and 2006[64] OSHP Environmental Inspection Reports depict DVWD's compliance with recreation requirements.

3.8.2 RECREATIONAL RESOURCE STANDARDS – BYPASS REACH

CRITERION	STANDARD	INSTRUCTIONS
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

The segment of the lower Crooked River from RM 17.8 downstream to RM 8 is a federally

[63] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2189320
[64] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4421227

designated Wild and Scenic River, with identified Outstandingly Resource Values that include recreation (USDI 1992). The Crooked River Wild and Scenic area is readily accessible and provides a variety of year-round recreation opportunities, including fishing, hiking, camping, hunting, photography, wildlife viewing, and boating (USDI BLM 1992). A survey conducted by the BLM indicated that the area received 29,750 visits annually in the early 1990s (BLM and BOR 1992), a level that probably has increased as the human population has expanded in the region. Angling is the primary recreational activity, particularly for native redband trout and mountain whitefish. Camping at group campgrounds as well as at dispersed sites is a popular activity. The area's recreational opportunities are well advertised through the State Scenic Highway and National Back Country Byway publications (USDI BLM 1992). The OSHP lies within an approximately 27-mile segment of the Crooked River used for whitewater kayaking, and recreational fishing takes place within the OSHP vicinity. A boat ramp exists in the reservoir to allow safe transit past the dam.

There are no specific recreation plans or license requirements for recreation facilities at OSHP, however the Project is subject to 18 C.F.R. Part 8 requirements and Article 18 of FERC's Terms and Conditions, and therefore, DVWD must provide recreation signage and postings as well as free public access to Project waters and adjacent lands (see Photo 1). The 2001[65] and 2006[66] OSHP Environmental Inspection Reports depict DVWD's compliance with recreation requirements.

[65] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2189320
[66] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4421227

3.8.3 RECREATIONAL RESOURCE STANDARDS – TAILRACE

CRITERION	STANDARD	INSTRUCTIONS
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

The segment of the lower Crooked River from RM 17.8 downstream to RM 8 is a federally designated Wild and Scenic River, with identified Outstandingly Resource Values that include recreation (USDI 1992). The Crooked River Wild and Scenic area is readily accessible and provides a variety of year-round recreation opportunities, including fishing, hiking, camping, hunting, photography, wildlife viewing, and boating (USDI BLM 1992). A survey conducted by the BLM indicated that the area received 29,750 visits annually in the early 1990s (BLM and BOR 1992), a level that probably has increased as the human population has expanded in the region. Angling is the primary recreational activity, particularly for native redband trout and mountain whitefish. Camping at group campgrounds as well as at dispersed sites is a popular activity. The area's recreational opportunities are well advertised through the State Scenic Highway and National Back Country Byway publications (USDI BLM 1992). The OSHP lies within an approximately 27-mile segment of the Crooked River used for whitewater kayaking, and recreational fishing takes place within the OSHP vicinity. A boat ramp exists in the reservoir to allow safe transit past the dam.

There are no specific recreation plans or license requirements for recreation facilities at OSHP, however the Project is subject to 18 C.F.R. Part 8 requirements and Article 18 of FERC's Terms and Conditions, and therefore, DVWD must provide recreation signage and postings as well as free public access to Project waters and adjacent lands (see Photo 1.) The 2001[67] and 2006[68] OSHP Environmental Inspection Reports depict DVWD's compliance with recreation requirements.

[67] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2189320
[68] http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4421227

CRITERION	STANDARD	INSTRUCTIONS
H	PLUS	Bonus Activities: • Document any new public recreational opportunities that have been created on facility lands or waters beyond those required by agencies (e.g., campgrounds, whitewater parks, boating access facilities and trails). • Document that such new recreational opportunities did not create unmitigated impacts to other resources.

In addition to the 18 C.F.R. Part 8 requirements and Article 18 of FERC's Terms and Conditions, DVWD voluntarily operates and maintains a kayak/canoe take-out area located upstream of the dam (Figure 5). Additionally, the licensee also voluntarily operates and maintains a small picnic area and restroom facilities downstream from the powerhouse.

FIGURE 5 UPSTREAM OSHP CANOE/KAYAK TAKE OUT FACILITY LOCATION

4.0 FACILITY CONTACTS FORM

1. All applications for LIHI Certification must include complete contact information to be reviewed.

Project Owner:	
Name and Title	Edson Pugh, General Manager
Company	Deschutes Valley Water District
Phone	(541) 475-3849
Email Address	Edson@dvwd.org
Mailing Address	881 SW Culver Highway, Madras, Oregon 97741
Project Operator (if different from Owner):	
Name and Title	Edson Pugh, General Manager
Company	Deschutes Valley Water District
Phone	(541) 475-3849
Email Address	Edson@dvwd.org
Mailing Address	881 SW Culver Highway, Madras, Oregon 97741
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	Finlay Anderson, Sr. Regulatory Consultant
Company	Kleinschmidt Associates
Phone	503-345-0517
Email Address	finlay.anderson@kleinschmidtgroup.com
Mailing Address	1500 NE Irving Street, Suite 550, Portland, Oregon 97232
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	Edson Pugh, General Manager
Company	Deschutes Valley Water District
Phone	(541) 475-3849
Email Address	Edson@dvwd.org
Mailing Address	881 SW Culver Highway, Madras, Oregon 97741
Party responsible for accounts payable:	
Name and Title	Joan Moe
Company	Deschutes Valley Water District
Phone	541-475-3849
Email Address	Jmoe@dvwd.org
Mailing Address	881 SW Culver Highway, Madras, Oregon 97741

2. Applicant must identify the most current and relevant state, federal, provincial, and tribal resource agency contacts (copy and repeat the following table as needed).

Agency Contact (Check area of responsibility: Flows☐, Water Quality ☐, Fish/Wildlife Resources ☒, Watersheds ☐, T/E Spp. ☒, Cultural/Historic Resources ☐, Recreation ☐):	
Agency Name	National Marine Fisheries Service
Name and Title	Scott Carlon
Phone	503-231-2379
Email address	scott.carlon@noaa.gov
Mailing Address	1201 NE Lloyd Blvd, Suite 1100, Portland, OR 97231

Agency Contact (Check area of responsibility: Flows☒, Water Quality ☒, Fish/Wildlife Resources ☐, Watersheds ☐, T/E Spp. ☐, Cultural/Historic Resources ☐, Recreation ☒):	
Agency Name	Oregon Department of Environmental Quality
Name and Title	Christopher Stine, Hydroelectric Specialist
Phone	541-686-7810
Email address	stine.chris@deq.state.or.us
Mailing Address	165 East 7th Ave, Suite 100, Eugene OR 97401

Agency Contact (Check area of responsibility: Flows☐, Water Quality ☐, Fish/Wildlife Resources ☒, Watersheds ☐, T/E Spp. ☒, Cultural/Historic Resources ☐, Recreation ☐):	
Agency Name	U.S. Fish and Wildlife Service
Name and Title	Peter Lickwar
Phone	541-312-6422
Email address	Peter_Lickwar@fws.gov
Mailing Address	63095 Deschutes Market Road, Bend, OR 97701

Agency Contact (Check area of responsibility: Flows☐, Water Quality ☐, Fish/Wildlife Resources ☒, Watersheds ☐, T/E Spp. ☒, Cultural/Historic Resources ☐, Recreation ☐):	
Agency Name	Oregon Department of Fish and Wildlife
Name and Title	Brett Hodgson
Phone	541-388-6363
Email address	Brett.L.Hodgson@state.or.us
Mailing Address	6134 Parrell Road, Bend, OR 97702

Agency Contact (Check area of responsibility: Flows☐, Water Quality ☐, Fish/Wildlife Resources ☐, Watersheds ☐, T/E Spp. ☐, Cultural/Historic Resources ☒, Recreation ☐):	
Agency Name	Confederated Tribes of the Warm Springs Reservation of Oregon
Name and Title	Brad Houslet
Phone	541-553-2039
Email address	bhouslet@wstribes.org
Mailing Address	PO Box C, Warm Springs, Oregon 97661

Agency Contact (Check area of responsibility: Flows☐, Water Quality ☐, Fish/Wildlife Resources ☐, Watersheds ☐, T/E Spp. ☐, Cultural/Historic Resources ☒, Recreation ☐):	
Agency Name	U.S. Department of Interior, Bureau of Indian Affairs
Name and Title	Jennifer Frozena
Phone	
Email address	jennifer.frozena@sol.doi.gov
Mailing Address	911 NE 11th Ave, Portland, OR 97212

Agency Contact (Check area of responsibility: Flows☒, Water Quality ☒, Fish/Wildlife Resources ☒, Watersheds ☒, T/E Spp. ☒, Cultural/Historic Resources ☒, Recreation ☒):	
Agency Name	U.S. Department of Interior, Bureau of Land Management
Name and Title	Jimmy Eisner
Phone	541-416-6753
Email address	Jimmy_Eisner@or.blm.gov
Mailing Address	3015 NE 3rd Street, Prineville, OR 97754

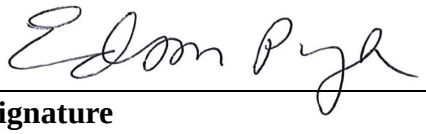
5.0 SWORN STATEMENT

As an Authorized Representative of Deschutes Valley Water District, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The Undersigned further acknowledges that is certification of the applying facility is issues, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified.

The Undersigned Applicant further agrees to hold the Low Impact Hydropower Institute, the Governing Board, and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.



Signature

Edson Pugh
Name

General Manager
Title

Deschutes Valley Water District
Company

6.0 REFERENCES

Griffin, R. M. 2009. Oregon cultural resources survey report, Opal Springs Hydroelectric fish passage improvements. BLM Report No.: 05050600486P.

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Oregon Department of Environmental Quality (ODEQ). 2011c. Assorted water quality data for the lower Crooked River, Oregon, acquired from the web-accessible LASAR database at: http://deq12.deq.state.or.us/lasar2/. [Accessed 1/21/2016].

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U.S. Fish & Wildlife Service (USFWS). 2015. US Fish and Wildlife Service, Information for Planning and Conservation (IPAC). Available at: https://ecos.fws.gov/ipac/ [Accessed 9/18/2015].

U.S. Fish & Wildlife Service (USFWS). 2016. US Fish and Wildlife Service, National Wetlands Inventory. Available at: https://www.fws.gov/wetlands/ [Accessed 7/1/2016].

U.S. Geological Survey (USGS). 2016. USGS 14087400 Crooked River Below Opal Springs, Near Culver, OR. National Water Information System. Available at: http://waterdata.usgs.gov/usa/nwis/uv?14087400 [Accessed 1/21/2016].

APPENDIX A

PROJECT PHOTOGRAPHS

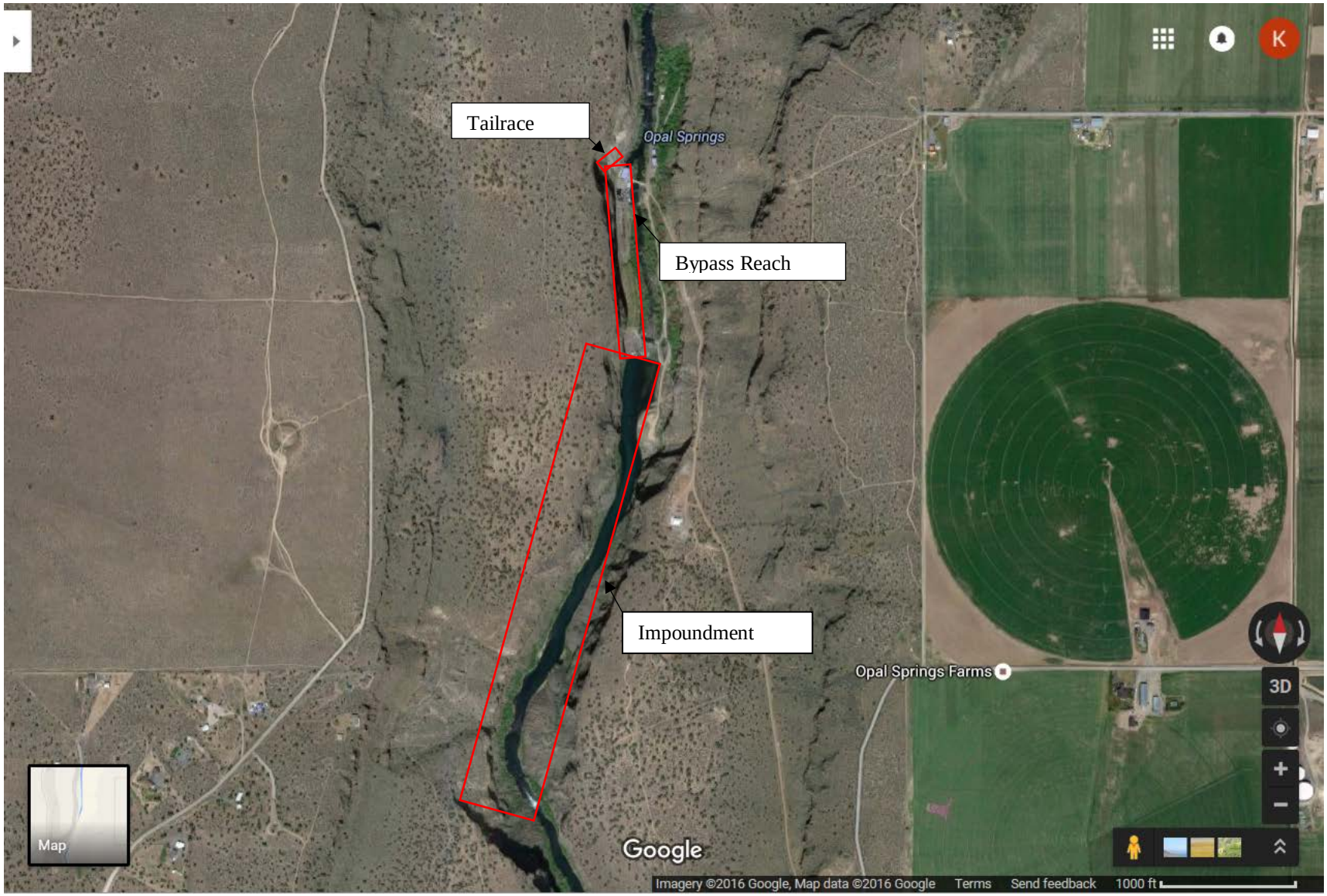

PHOTO 1 OVERVIEW OF PROJECT ZONES OF EFFECT

PHOTO 2 RESERVOIR/DOWNSTREAM PROJECT VIEW

PHOTO 3 UPSTREAM VIEW OF CONCRETE CAPPED ROCKFILL DIVERSION DAM

PHOTO 4 CONCRETE CAPPED ROCKFILL DIVERSION DAM

PHOTO 5 PROJECT TAILRACE

APPENDIX B

PROJECT DRAWINGS

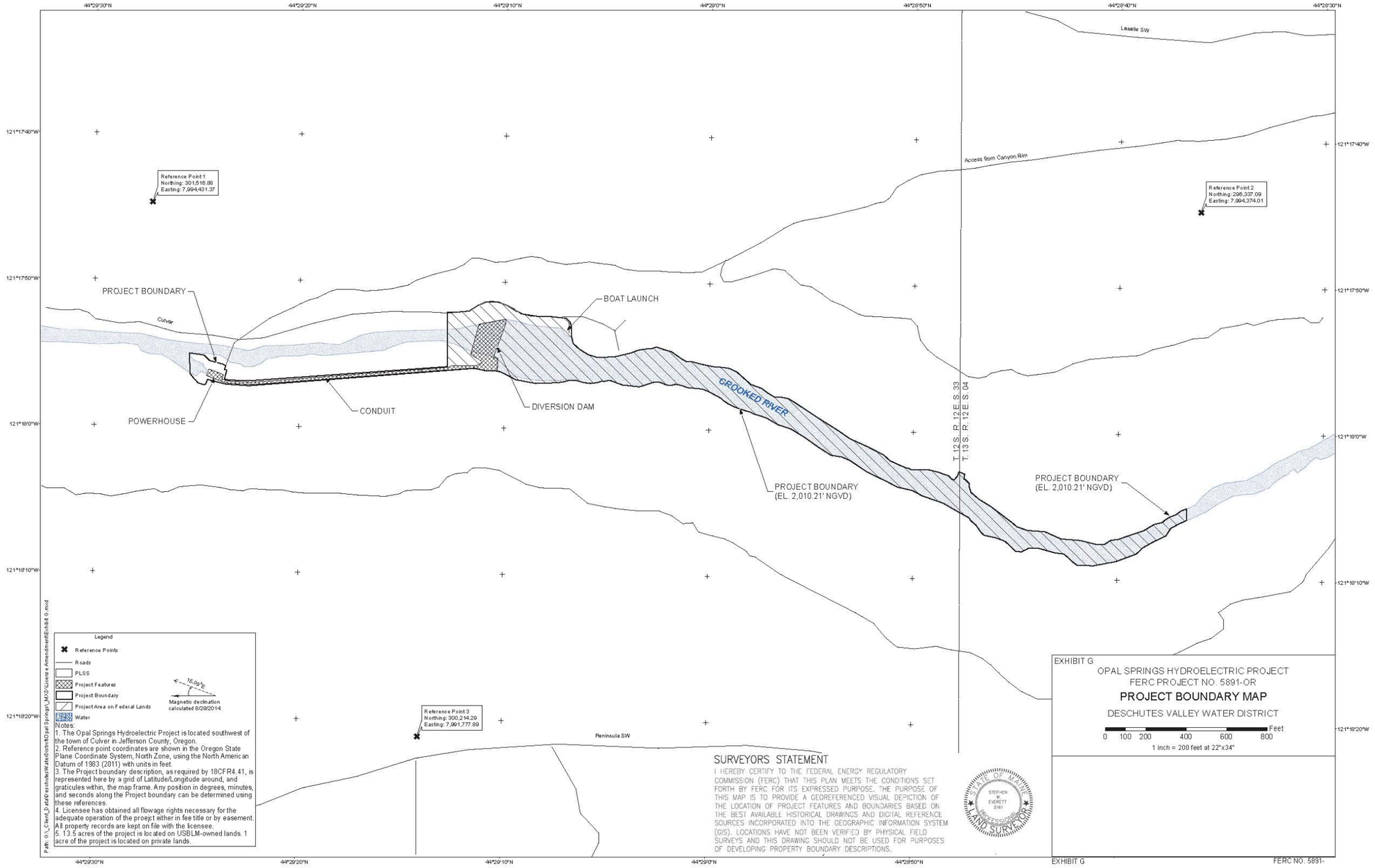

FIGURE 1 PROPOSED EXHIBIT G

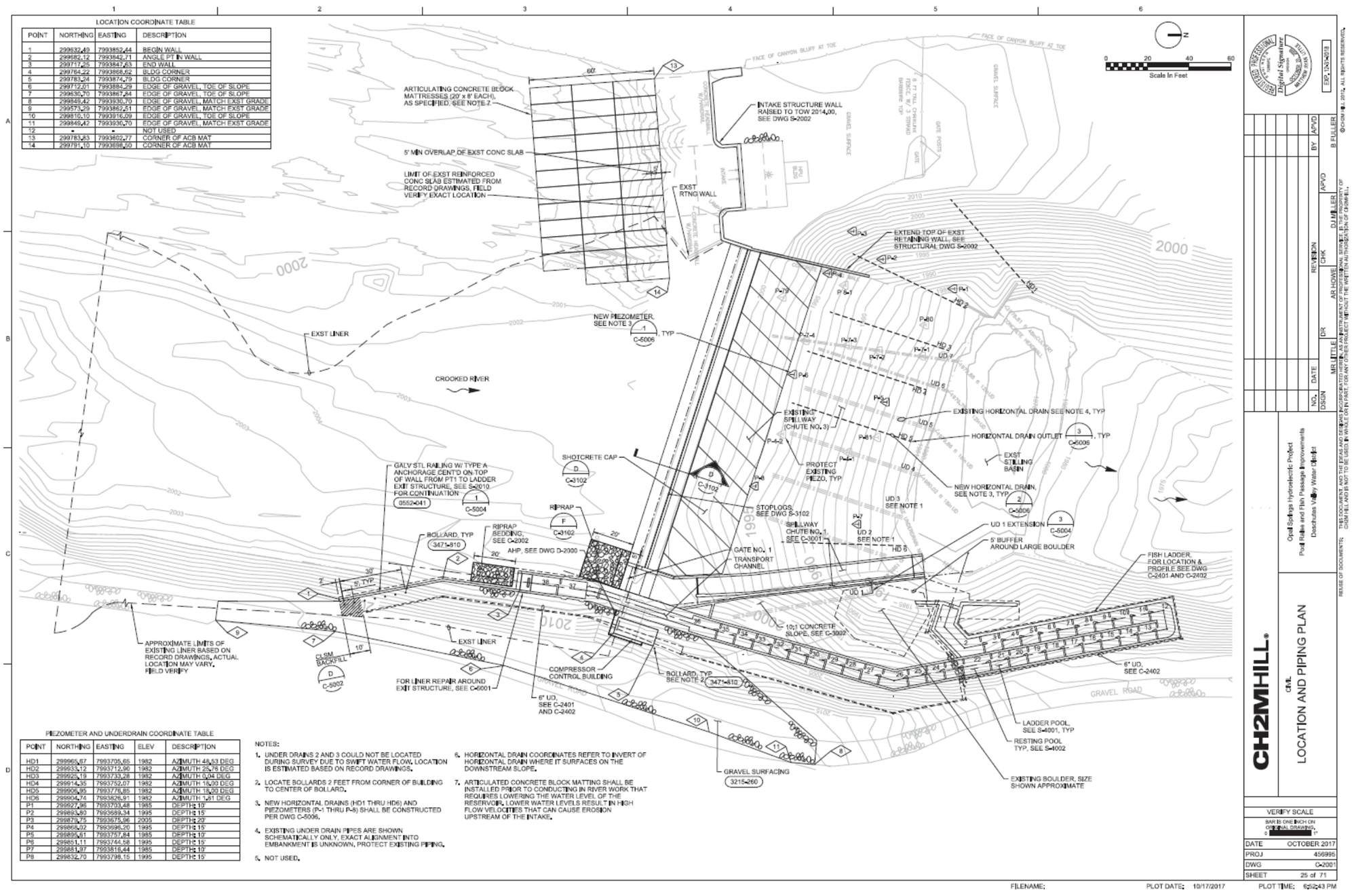

FIGURE 2 PROPOSED UPSTREAM FISHWAY DESIGN

APPENDIX C

OREGON DEQ *FINAL* SECTION 401 WATER QUALITY CERTIFICATION RE-ISSUED DECEMBER 13, 2017

Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
TTY 711

December 13, 2017

Edson Pugh, General Manager
Deschutes Valley Water District
881 SW Culver Highway
Madras, Oregon 97741

Re: Opal Springs Hydroelectric Project, FERC Project No. 5891
Modification of Section 401 Water Quality Certification

Dear Mr. Pugh:

On October 8, 2015 the Deschutes Valley Water District filed with the Federal Energy Regulatory Commission an application for a non-capacity amendment to its existing operating license to install and operate fish passage facilities at the project. On October 26, 2016, the Oregon Department of Environmental Quality issued Deschutes Valley a quality certification pursuant to Section 401 of the federal Clean Water Act and ORS 468B.040.

Since filing the license amendment application, Deschutes Valley has modified certain technical aspects of the proposed activity. The changes affect proposed license articles and certain conditions addressed by the 401 certification. On June 12, 2017 Deschutes Valley requested DEQ review revisions to the proposed activity and, if warranted, modify the certification in accordance with state law.

Based on our evaluation of the activity and in consideration of comments received from the public, DEQ is reasonably assured that operations under an amended FERC license will be consistent applicable provisions of Clean Water Act Sections 301, 302, 303, 306, and 307, state water quality standards, and other appropriate requirements of state law. DEQ hereby issues a modified section 401 water quality certification as allowed by OAR 340-048-0050.

The certification is valid for Deschutes Valley Water District and is not transferable without written approval of the Department, in accordance with OAR 340-048-0042(6). If dissatisfied with the conditional certification, Deschutes Valley may request a hearing before the Environmental Quality Commission. Your request for a hearing must be made in writing to the Director of the Oregon Department of Environmental Quality within 20 days of the date of mailing of this certification. Any hearing will be conducted pursuant to the rules of the Environmental Quality Commission for contested cases.

If you have any questions, please contact Chris Stine at (541) 686-7810 or via email at stine.chris@deq.state.or.us.

Sincerely,

David Belyea
Acting Western Region Administrator

Attachment: Modified section 401 water quality certification

ec: Chris Stine, DEQ
Mary Grainey, OWRD
Ken Homolka, ODFW
Peter Lickwar, USFWS
Scott Carlon, NMFS
Finlay Anderson, Kleinschmidt

Clean Water Act § 401 Certification
for the
Deschutes Valley Water District
Opal Springs Hydroelectric Project
(FERC No. 5891)
Crooked River Subbasin,
Jefferson County, Oregon

Upon Federal Energy Regulatory Commission issuance of an amended license for the Opal Springs Hydroelectric Project, the Deschutes Valley Water District shall comply with the following § 401 water quality certification conditions:

1. Water Quality Management Plan

Within six months of receiving an amended FERC license Deschutes Valley Water District shall submit a Water Quality Management Plan to the Oregon Department of Environmental Quality. Upon approval by DEQ, Deschutes Valley Water District shall file the WQMP with FERC and implement the WQMP upon FERC approval. The WQMP must address parameters specified in this § 401 water quality certification and include:

a) Data collection protocol, analytical methods, and laboratory method reporting limits;
b) Location and description of monitoring points;
c) Compliance monitoring and field audit schedule;
d) Data sampling frequency;
e) Applicable compliance criteria;
f) Instrument calibration procedures and schedule;
g) Data validation procedures and quality assurance methodology; and
h) Contingency plan for inoperable or malfunctioning equipment.

2. Biological Criteria; Protection of Beneficial Uses; Instream Flows

a) Bypass Reach Flows
Deschutes Valley shall maintain a minimum continuous instream flow of 50 cfs in the bypass reach below the dam in accordance with Article 36 of the current FERC license.

b) Bypass Flow Accrual Account (BFAA)
Deschutes Valley Water District shall establish, manage, and administer the Bypass Flow Accrual Account in accordance with methodology presented in proposed License Article 4 of the 2015 Amended and Restated Settlement Agreement.

c) Fish Passage
Deschutes Valley Water District shall construct, operate, and maintain fish passage facilities in accordance with the criteria described in proposed License Article 2 of the 2015 Amended and Restated Settlement Agreement.

d) Beneficial Use
If DEQ determines that operation of the fish passage facilities described in Condition 2c of these Conditions extends the range of documented spawning habitat used by salmon, steelhead, or bull trout, the Deschutes Valley Water District must take appropriate actions to comply with the following additional conditions, unless otherwise specified by DEQ:

(1) The seven-day-average maximum temperature may not exceed 12.0 degrees Celsius in stream segments with documented bull trout spawning and juvenile rearing use;
(2) The seven-day-average maximum temperature may not exceed 13.0 degrees Celsius during the period identified by DEQ in stream segments with documented salmon or steelhead spawning use;
(3) Dissolved oxygen may not be less than 11.0 mg/l during the period identified by DEQ in stream segments with documented active spawning use, and if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the dissolved oxygen limit is 9.0 mg/l.

DEQ will notify Deschutes Valley Water District in writing of its determination that these additional conditions are required, including the corresponding areas and time periods in which each condition applies.

Upon such notification, Deschutes Valley Water District may submit within 90 days an alternative plan that demonstrates compliance with these conditions for DEQ's review. If, after public review and comment in accordance with applicable law, if any, DEQ approves or conditionally approves that plan as consistent with water-quality standards, then DVWD will implement that plan, as conditioned, in accordance with its terms.

3. Narrative Criteria: Objectionable Discoloration, Scum, and Oily Sheens

a) Best Management Practices
Deschutes Valley Water District must employ Best Management Practices when handling, storing, or using materials which may, if spilled, result in adverse or objectionable conditions in violation of this water quality standard.

b) 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, Deschutes Valley must implement effective spill response procedures, notify Oregon Emergency Response System, and comply with ORS Chapters 466 and 468, as applicable.

c) Recordkeeping
For the term of the amended license, Deschutes Valley Water District shall retain records for the period of time required by law which document: the occurrence of reportable releases; visual observations and/or photographic documentation of hazardous material releases which impact aquatic resources; remedial activities undertaken by Deschutes Valley Water District or a contractor to address hazardous material releases; correspondence and/or conversation records which document agency notification, as warranted regarding hazardous material releases; other records deemed appropriate.

4. Dissolved Oxygen

a) Water Quality Monitoring Plan

The WQMP developed by Deschutes Valley Water District pursuant to Condition 1 of these § 401 Certification Conditions shall incorporate the dissolved oxygen monitoring requirements presented below:

(1) Impoundment

Deschutes Valley Water District shall continuously measure DO at upstream and downstream locations in the diversion pool for a minimum of 30 consecutive days during the first July and August when the diversion pool is maintained at an average elevation of at least 2,006.61 feet MSL (i.e., 80 percent of the proposed increase in elevation).

Beginning no later than May 1, Deschutes Valley Water District shall continuously measure DO at the above referenced locations for at least 15 consecutive days during the first May in which the diversion pool is maintained at an average elevation of at least 2,006.61 feet MSL.

(2) Bypass Reach

Concurrent with the measurements and schedules described in Condition 4a(1) above, Deschutes Valley Water District shall measure DO in the upper bypass reach in the vicinity of the proposed ladder entrance.

b) Duration

Water quality monitoring is required for three consecutive years beginning in the first year following completion of fish passage facilities identified in Condition 2c. If, after the second year of required monitoring, DEQ is reasonably assured the Project will meet applicable water quality standards, DEQ may approve discontinuing further monitoring. Alternatively, DEQ may require additional monitoring and/or adaptive management after the third year of monitoring, as warranted, to demonstrate provide support for all recognized beneficial uses.

c) Reporting

Deschutes Valley Water District shall report DO monitoring data to DEQ by December 31 of each year for which monitoring was performed. The report shall address the requirements in Condition 1 of these Conditions and analyze the effects, if any, of Project operation on the DO water quality standard. Following review and approval of the report by DEQ, Deschutes Valley Water District shall file the report with FERC.

d) Adaptive Management

If monitoring indicates the DO water quality standard is not met, DEQ will require Deschutes Valley Water District to submit a report analyzing the situation and shall require additional monitoring and adaptive management of the Project to ensure Project operation does not contribute to violations of water quality standards. Strategies to achieve this objective may include reducing the operating elevation of the diversion pool, increasing flow in the bypass reach or other operational adjustments to ensure Project operation does not contribute to violations of water quality standards.

5. Hydrogen Ion Concentration (pH)

a) Water Quality Monitoring Plan

The WQMP developed by Deschutes Valley Water District pursuant to Condition 1 of these § 401 Certification Conditions shall incorporate the pH monitoring requirements presented below:

(1) Impoundment

Deschutes Valley Water District shall measure pH at upstream and downstream locations in the diversion pool for a minimum of 30 consecutive days during the first July and August when the diversion pool is maintained at an average elevation of at least 2,006.61 feet MSL.

(2) Bypass Reach

Concurrent with the measurements and schedules described in Condition 5(a)(1) above, Deschutes Valley Water District shall measure pH in the upper bypass reach in the vicinity of the proposed ladder entrance.

b) Duration

Water quality monitoring is required for three consecutive years beginning in the first year following completion of fish passage facilities identified in Condition 2c. If, after the second year of required monitoring, DEQ is reasonably assured the Project will meet applicable water quality standards, DEQ may approve discontinuing further monitoring. Alternatively, DEQ may require additional monitoring and/or adaptive management after the third year of monitoring, as warranted, to demonstrate provide support for all recognized beneficial uses.

c) Reporting

Deschutes Valley Water District shall report pH monitoring data to DEQ by December 31 of each year for which monitoring was performed. The report shall address the requirements in Condition 1 of these Conditions and analyze the effects, if any, of Project operation on the pH water quality standard. Following review and approval of the report by DEQ, Deschutes Valley Water District shall file the report with FERC.

d) Adaptive Management

If monitoring indicates the pH water quality standard is not met, DEQ will require Deschutes Valley Water District to submit a report analyzing the situation and shall require additional monitoring and or adaptive management of the Project to ensure Project operation does not contribute to violations of water quality standards. Strategies to achieve this objective may include reducing the operating elevation of the diversion pool, increasing flow in the bypass reach, or other operational adjustments to ensure Project operation does not contribute to violations of water quality standards.

6. Temperature

a) Water Quality Monitoring Plan

The WQMP developed by Deschutes Valley Water District pursuant to Condition 1 of these § 401 Certification Conditions shall incorporate the minimum temperature monitoring requirements presented below:

(1) Impoundment

Deschutes Valley Water District shall measure temperature at upstream and downstream locations in the diversion pool from May 1 through September 30 beginning with the first

year after completion of activities proposed under the proposed license amendment. Monitoring shall include a minimum of 30 days during the July and August when the diversion pool is maintained at an average elevation of at least 2,006.61 feet.

(2) Bypass Reach

Concurrent with the measurements and schedules described in Condition 6a(1) above, Deschutes Valley Water District shall measure temperature in the upper bypass reach in the vicinity of the proposed ladder entrance.

b) Duration

Water quality monitoring is required for three consecutive years beginning in the first year following completion of fish passage facilities identified in Condition 2c. Based on the results of the first and second year of required monitoring, DEQ will determine whether monitoring may be discontinued or additional data collection is required. If DEQ determines that additional data collection is required, DEQ will require additional monitoring and adaptive management.

c) Reporting

Deschutes Valley Water District shall report temperature monitoring data to DEQ by December 31 of each year for which monitoring was performed. The report shall address the requirements in Condition 1 of these Conditions and analyze the effects, if any, of Project operation on the temperature water quality standard. Following review and approval of the report by DEQ, Deschutes Valley Water District shall file the report with FERC.

d) Adaptive Management

If monitoring indicates the temperature water quality standard is not met, DEQ will require Deschutes Valley Water District to submit a report analyzing the situation and may require additional monitoring and/or adaptive management of the Project to ensure Project operation does not contribute to violations of water quality standards. Adaptive measures may include altering the timing and/or magnitude of Bypass Flow Accrual Account releases to minimize temperature increases in the bypass reach, lowering the elevation of the diversion pool to decrease retention time, or other measures intended to reduce Project-related thermal impacts. Deschutes Valley Water District must submit the report within six months of identifying temperature exceedances. Upon DEQ approval, Deschutes Valley shall submit the plan to FERC for approval. Upon FERC approval, Deschutes Valley shall implement the plan.

7. General Conditions

a) Certification Modification

DEQ, in accordance with Oregon and Federal law including OAR Chapter 340, Division 48 and, as applicable, 33 USC 1341, may modify this Certification to add, delete, or alter Certification conditions as necessary to address:

(1) Adverse or potentially adverse Project effects on water quality or designated beneficial uses that did not exist or were not reasonably apparent when this § 401 Certification was issued;

(2) TMDLs (not specifically addressed above in these § 401 Certification Conditions);

(3) Changes in water quality standards;

(4) Any failure of these § 401 Certification Conditions to protect water quality or designated beneficial uses as expected when this § 401 Certification was issued; or;

(5) Any change in the Project or its operations that was not contemplated by this § 401 Certification that might adversely affect water quality or designated beneficial uses.

b) Other Federal Permits
Upon applying for any federal license or permit authorizing a discharge to waters of the United States other than the new or amended FERC license, Deschutes Valley Water District shall provide DEQ written notice of such application and of any proposed changes or new activity requested to be authorized under the application since issuance of this § 401 Certification. DEQ will notify Deschutes Valley Water District and the applicable federal agency either that: (1) this § 401 Certification is sufficient for purposes of the federal license or permit; or (2) in light of new information related to the water quality impacts of the activity requested to be authorized under the application, there is no longer reasonable assurance of compliance with state water quality standards. In the latter event, ODEQ will consider the new information, solicit and consider public and agency comment as required by law, and issue a 401 certification determination for purposes of the federal license or permit.

For projects which require in-water work, Deschutes Valley Water District shall obtain, as applicable, a removal-fill permit from Oregon Department of State Lands, a dredge and fill permit from the Corps pursuant to § 404 of the Clean Water Act, and a §401 water quality certification from DEQ.

c) Project Modification
Deschutes Valley Water District shall obtain DEQ review and approval before undertaking any change to the Project that might significantly affect water quality (other than project changes authorized by a new or amended FERC license or required by or considered in this § 401 Certification), including changes to Project structures, operations, and flows.

d) Repair and Maintenance
Deschutes Valley Water District shall obtain DEQ review and approval before undertaking Project repair or maintenance activities that might significantly affect water quality (other than repair or maintenance activities authorized by a new or amended FERC license required by or considered in this § 401 Certification). DEQ may, at Deschutes Valley Water District's request, provide such prior approval effective prospectively for specified repair and maintenance activities.

e) Inspection
Deschutes Valley Water District shall allow DEQ such access as necessary to inspect the Project area and Project records required by these § 401 Certification Conditions and to monitor compliance with these § 401 Certification Conditions, upon reasonable notice and subject to applicable safety and security procedures when engaged in such access.

f) Posting
Deschutes Valley Water District shall post or maintain a copy of these § 401 Certification Conditions at the Opal Springs Hydro Project Office.

8. Project Specific Fees

In accordance with ORS 543.080, Deschutes Valley Water District shall pay project-specific fees, in 2016 dollars adjusted according to the formula in Condition 8c below, to DEQ for costs of overseeing implementation of this Certification.

a) Oregon Department of Environmental Quality
Deschutes Valley Water District shall pay project-specific fees to ODEQ, made payable to State of Oregon, Department of Environmental Quality, according to the following schedule:

FERC License	Annual Project-Specific Fee Subject to Adjustment	Due
Upon License Amendment	$ 3,500 prorated to June 30	Within 30 days
Years 1 - 5	$ 3,500	July 1

b) Annual Adjustment
Fee amounts shall be adjusted annually, according to the following formula:

AD = D x (CPI-U)/(CPI-U-June 2010)

Where:

AD = Adjusted dollar amount payable to agency.
D = Dollar amount pursuant to Condition 8a above,
CPI-U = the most current published version of the Consumer Price Index-Urban. The CPI-U is published monthly by the Bureau of Labor Statistics of the U.S. Department of Labor. If that index ceases to be published, any reasonably equivalent index published by the Bureau of Economic Analysis may be substituted by written agreement between DEQ and Deschutes Valley Water District.

c) Payment Schedule
Fees shall be paid pursuant to a written invoice from DEQ. Except as provided below, project-specific fees shall be due on July 1 of each year following issuance of the new FERC License. Deschutes Valley Water District shall pay an initial prorated payment to DEQ within 30 days of issuance of the amended FERC license, for the period from the date of license issuance to the first June 30 which follows license amendment issuance.

d) Credits
DEQ will credit against this amount any fee or other compensation paid or payable to DEQ directly or through other agencies of the State of Oregon, during the preceding year (July 1 to June 30) for DEQ's costs of oversight.

e) Expenditure Summary
Upon request, DEQ shall, on a biennial basis, provide Deschutes Valley Water District with a summary of project specific expenditures.

f) Duration
The DEQ fee shall expire 3 years after the first July 1 following the issuance of the new FERC license, unless DEQ terminates it earlier because oversight is no longer necessary. One year before the expiration of the fee, or earlier if mutually agreed, DEQ and Deschutes Valley Water District shall review the need, if any, to modify, extend, or terminate the fee, in accordance with ORS 543.080. Deschutes Valley Water District shall pay any project-specific fee required after such review as provided in ORS 543.080.

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

David Belyea
Western Region Administrator

Date 12-13-2017