Yale Hydroelectric Project
FERC Project No. P-2071

Before the
United States of America
Federal Energy Regulatory Commission

Application for License Amendment

Volume I of V
Initial Statement and Exhibits A, C, D, and G

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

July 2020

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Yale Hydroelectric Project
(FERC No. P-2071)

APPLICATION FOR LICENSE AMENDMENT

This application for license amendment for the Yale Hydroelectric Project (FERC No. P-2071) consists of the following volumes:

Volume I

Initial Statement
Exhibit A – Project Description
Exhibit C – Project Installation and Proposed Schedule
Exhibit D – Costs and Financing
Exhibit G – Project Maps

Volume II

Exhibit E – Environmental Report

Volume III

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Volume V

CONFIDENTIAL – Cultural Resource Summary for the Merwin, Yale and Swift No. 1 Projects

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Initial Statement

Yale Hydroelectric Project
(FERC No. P-2071)

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BEFORE THE
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION
PACIFICORP PROJECT NO. P-2071

APPLICATION FOR NON-CAPACITY AMENDMENT OF LICENSE FOR A MAJOR PROJECT - EXISTING DAM

INITIAL STATEMENT

(Pursuant to 18 CFR § 4.201)

1. PacifiCorp (PacifiCorp, Licensee, or Applicant) applies to the Federal Energy Regulatory Commission (FERC or Commission) for a non-capacity amendment of the license for the Yale Project (Project) as described in the enclosed exhibits.

2. The exact name, business address, and telephone number of the Applicant are:

   PacifiCorp
   825 N.E. Multnomah St., Suite 1800
   Portland, Oregon 97232

   The exact name and business address of each person authorized to act as agents for the Applicant in this application are:

   Todd Olson
   Director of Compliance, Renewable Resources
   PacifiCorp
   825 N.E. Multnomah St., Suite 1800
   Portland, OR 97232
   (503) 813-6657
   todd.olson@pacificorp.com

3. The Applicant is a domestic corporation organized under the laws of the State of Oregon and Licensee for the Yale Hydroelectric Project designated as (FERC No. P-2071) in the records of the Federal Energy Regulatory Commission, original license issued on October 29, 1956. The Commission issued a new license for the Project on June 26, 2008.

4. The amendments of license proposed and the reason(s) why the proposed changes are necessary:

   Ordering Paragraphs (F) and (G) of the Project license incorporate the fishway prescriptions submitted by National Marine Fisheries Service ("NMFS") and the United States Fish and Wildlife Service ("USFWS" collectively with NMFS, the "Services") under Section 18 of the Federal Power Act. Among these prescriptions was an obligation to construct an upstream fish passage facility at the Project on or before June 26, 2025, the

17th anniversary of the date FERC issued the new license. These fishway prescriptions were developed collaboratively among PacifiCorp, the Services, and other stakeholders in a comprehensive Settlement Agreement ("Agreement"). The Agreement also provided that should the Services determine, after review of new information, that the fish passage facilities into or out of Yale Lake or Merwin Lake are inappropriate, PacifiCorp would establish an "In Lieu Fund" to support mitigation measures for anadromous salmonids in lieu of passage.

Moreover, Article 401(b) of each FERC license includes a list of fish passage conditions that, if modified, would require a license amendment. The lists in Article 401(b) identify the Section 18 fish passage prescriptions that cover the Merwin and Yale Reservoir Facilities. In Article 401(b) of the licenses, FERC acknowledged that because of the provisions in the Agreement relating to the Services' review of fish passage, changes to the fish passage conditions could be required:

> Certain conditions in the appendices contemplate unspecified long-term changes to project operations, requirements, or facilities for the purpose of protecting and enhancing environmental resources. These changes may not be implemented without prior Commission authorization granted after the filing of an application to amend the license.

New Information Regarding Fish Passage

Beginning in November 2011, PacifiCorp and Public Utilities District No. 1 of Cowlitz County ("Cowlitz PUD" together with PacifiCorp, the "Utilities") began consultation with the members of the Lewis River Aquatic Coordination Committee ("ACC") over the development of new information to submit to the Services for their determination if the additional fish passage facilities identified in the Agreement and in the Section 18 prescriptions were appropriate (the "New Information"). The Utilities submitted the New Information to the Services on June 24, 2016. A detailed description of the consultation with the ACC during preparation of the New Information is included Exhibit E.

The Services responded on April 11 and 12, 2019, providing the Utilities with a preliminary determination under Section 4.1.9 of the Settlement Agreement. Specifically, NMFS proposed and USFWS concurred in the following actions:

1) To forego construction of the Merwin Downstream Facility (Section 4.6 of the Settlement Agreement) and the Yale Upstream Facility (Section 4.7);

2) To require PacifiCorp to establish the In Lieu Fund consistent with the requirements of Section 7.6 of the Settlement Agreement; and

3) To defer a decision whether to construct the Yale Downstream Facility (Section 4.5) and the Swift Upstream Facility (Section 4.8) until 2031 and 2035, respectively, so that performance of in lieu habitat restoration could be considered in that future decision.

The Services directed that restoration efforts supported by the In Lieu Fund (the "In Lieu Program") focus on stream reaches upstream of the Swift reservoir that benefit three salmon species listed under the Endangered Species Act (ESA): (coho salmon [Oncorhynchus kisutch], winter steelhead [O. mykiss], and spring Chinook salmon [O. tshawytscha]). The Services identified the following reaches known to support all three species since reintroduction efforts began in 2012:

- Clearwater River (8.37 kilometers [km])
- Clear Creek (22.96 km)
- North Fork of the Lewis River (22.69 km)
- Drift Creek (1.52 km)

In addition, the USFWS, in an April 12, 2019, letter, directed the Utilities to proceed immediately with the development of the following fish passage measures for bull trout (*Salvelinus confluentus*) pursuant to Section 4.10 of the Settlement Agreement:

- Yale Downstream Bull Trout Passage Facility
- Swift Upstream Bull Trout Passage Facility
- Yale Upstream Bull Trout Passage Facility

USFWS elected to defer a decision on whether to require construction of the Merwin Downstream Bull Trout Passage Facility to evaluate whether bull trout have increased sufficiently in number in the Merwin reservoir to warrant construction. A determination by the USFWS regarding the Merwin Downstream Bull Trout Passage Facility is not due before 2025.

Requested License Amendments

Given the Services' preliminary determinations, the Utilities are engaging in the following activities:

- Development of an In Lieu Program Strategic Plan that will guide identification, selection and implementation of mitigation actions in the Lewis River in consultation with the Settlement Agreement parties;
- Development of an In Lieu Program Monitoring Plan that will guide the review and reporting of Strategic Plan actions;
- Development of a Biological Assessment to inform any required Endangered Species Act and Magnuson-Stevens Act consultation with the Services in support of the license amendment; and
- Preparation of a Bull Trout Passage Plan outlining designs for bull trout facilities in consultation with the U.S. Fish and Wildlife Service and the Settlement Agreement parties.

In addition to these activities, subject to the Services' final determinations, the Utilities seek non-capacity amendments to the Lewis River Project Licenses and the incorporated fishway prescriptions. These amendments are necessary to enable construction of bull trout facilities, construction of mitigation projects within the Project boundaries, and changes in the nature and timing of the construction of fishways prescribed under Section 18 of the Federal Power Act.

Required Exhibits

For this non-capacity amendment, consistent with the requirements of 18 CFR § 4.201(c), only those exhibits applicable to the proposed changes necessary to implement the Service's In-Lieu Determination are provided.

Exhibit A - Project Description – Enclosed within Volume I

Exhibit B - Project Operations – The non-capacity amendment proposed in this application will have no impact on Project operations and, accordingly, Exhibit B is not provided.

Exhibit C - Project Installation and Proposed Schedule – Enclosed within Volume I

Exhibit D - Costs and Financing – Enclosed within Volume I

Exhibit E - Environmental Analysis – Enclosed within Volume II, appendices to Exhibit E are provided in Volume III

Exhibit F - Project Drawings – Enclosed within Volume I

Exhibit G - Project Boundaries – Enclosed

5. (i) The statutory or regulatory requirements of the state in which the project would be located that affect the project as proposed with respect to bed and banks and the appropriation, diversion, and use of water for power purposes are:

- Section 404 Permit – US Army Corps of Engineers
- In-water Work Protection Plan Approval – Washington Department of Ecology
- General Construction Stormwater Permit – Washington Department of Ecology
- Hydraulic Project Approval – Washington Department of Fish and Wildlife
- Shoreline, Critical Areas and Land Use Approvals – Clark County / Skamania County
- Aquatic Land Lease – Washington Department of Natural Resources

(ii) The steps which the applicant has taken or plans to take to comply with each of the laws cited above are: The full list of permits required to implement the Services' determinations will be developed following final design completion. The Utilities will obtain all necessary permits prior to construction.

6. PacifiCorp is the owner of all existing project facilities

SUBSCRIPTION

This Application for License Amendment for the Yale Project, FERC Project No. P-2071 is executed in the State of Oregon, County of Multnomah, by Todd Olson, Director of Compliance Renewable Resources, PacifiCorp, 825 NE Multnomah St., Suite 1800, Portland, Oregon, 97232, who, being duly sworn, deposes and says that the contents of this application are true to the best of his/her knowledge or belief and that he/she is authorized to execute this application on behalf of PacifiCorp.

The undersigned has signed his application this 1 day of July, 2020.

Todd Olson
Director of Compliance, Renewable Resources

VERIFICATION

Subscribed and sworn to before me, a Notary Public of the State of Oregon this 1 day of July, 2020.

Notary Public – Kimberly L. McCune

My Commission Expires 12-26-2020

OFFICIAL SEAL
KIMBERLY L MCCUNE
NOTARY PUBLIC - OREGON
COMMISSION NO. 957571
[MY COMM]ISSION EXPIRES DECEMBER 26, 2020

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EXHIBIT A – PROJECT DESCRIPTION

Yale Hydroelectric Project
(FERC No. P-2071)

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Note to reader – This document revises the current Yale Hydroelectric Project Exhibit A on file with the Federal Energy Regulatory Commission. All proposed revisions are identified in track changes.

A.1.0 Introduction

In compliance with the Code of Federal Regulations (18 CFR, Parts 4 and 16), PacifiCorp Energy applied to the Federal Energy Regulatory Commission (FERC) to re-license the Yale Hydroelectric Project, FERC Project No. P-2071, which PacifiCorp Energy currently owns and operates, on the North Fork Lewis River, in the State of Washington. The initial license for the Yale Project was issued on April 30, 1951 and expired on April 30, 2001. The current license, effective June 1, 2008, and expiring May 31, 2058, was issued under Order Issuing New License (123 FERC ¶62,257) on June 26, 2008. An Order on Rehearing (125 FERC ¶ 61,046) was issued October 16, 2008.

Exhibit A – Project Description

This Exhibit A is a description of the Yale Project. It includes the location, general configuration, physical composition, and dimensions of the project structures. The description also includes information on the turbine-generator unit, as well as appurtenant civil, mechanical, and electrical equipment.

Exhibit A is organized in five sections that follow the sequence of information requested in the CFRs. Following this introduction, the existing facilities are described in Section 2.0. In Section 3.0, proposed modifications are described. Section 4.0 contains a statement regarding lands of the United States within the project boundary. Section 5.0 contains reference cites.

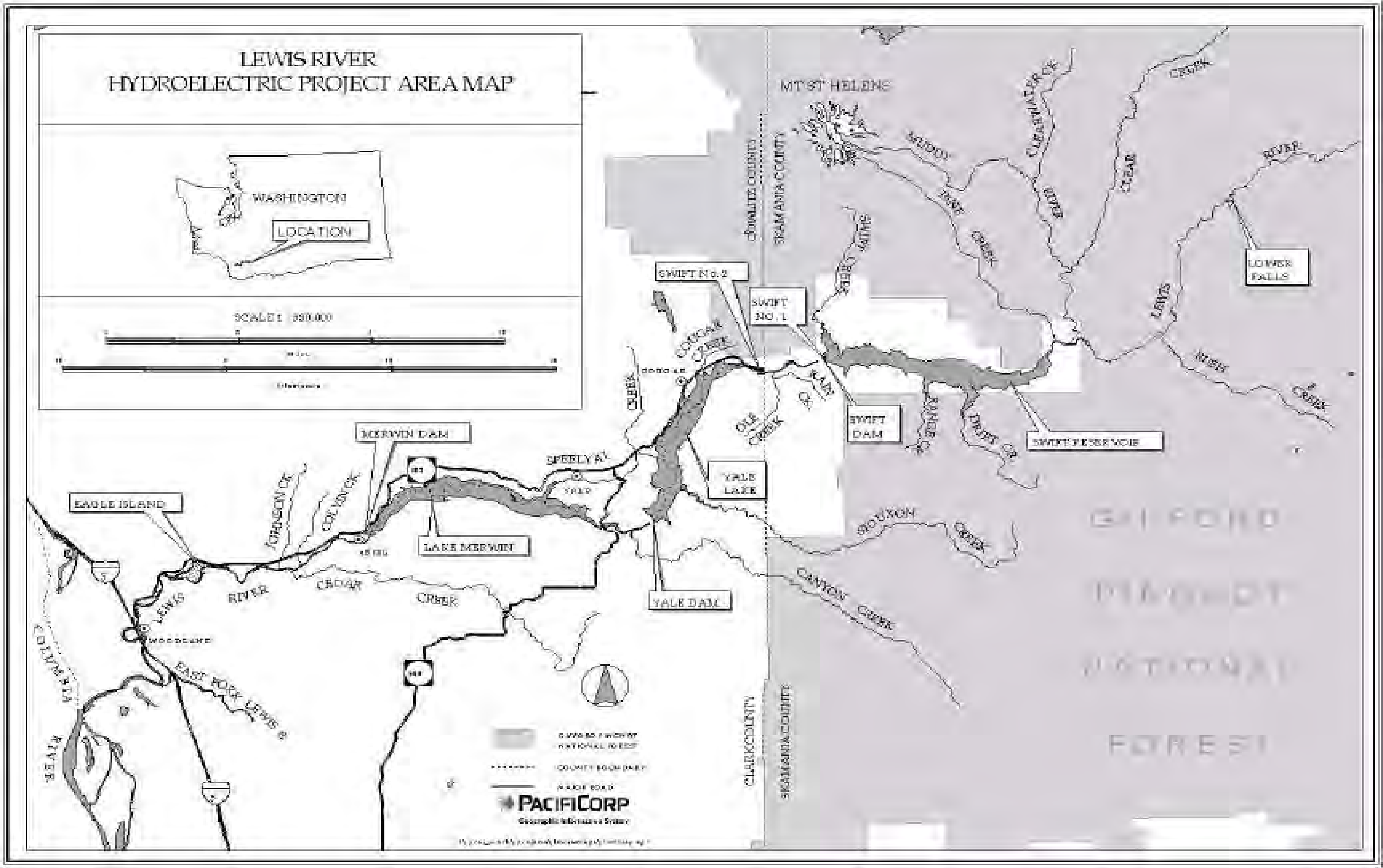

Figure A.1.0-1 Lewis River Hydroelectric Projects Area Map

A.2.0 Existing Structures

The Yale Hydroelectric Project is located on the North Fork Lewis River at the upstream end of Lake Merwin at river mile (RM) 34. The site is approximately 23 miles east of Woodland, Washington and 45 miles northeast of Portland, Oregon, about 35 miles upstream of the confluence of the North Fork Lewis River with the Columbia River. The Yale Project location within the North Fork Lewis River drainage basin is shown on Figure A.1.0-1.

The major components of the Yale Project include a reservoir, a main embankment dam, a low earth-fill saddle dam, a concrete chute-type spillway, and a 2-unit powerhouse. The significant project data are listed in Table A.2.0-1. A description of the civil, mechanical, and electrical systems for the major project components and their physical and operating conditions are as follows.

Table A.2.0-1 Yale Project Data

GENERAL		
Plant Name	Yale	
FERC Project No./License Expiration	2071/2001	
Location	Yale, Washington	
Stream Name	North Fork Lewis River	
Minimum Flow Requirement (cfs)	None	
Plant Data		
Plant Capacity, kW at 0.90 PF	134,000	
Number of Units	2	
Rated Net Head	240 feet	
Plant Discharge	9,640 cfs	
Average Annual Generation (Gross)	553,947 MWh (30-years 1958-1987)	
CIVIL SYSTEMS		
Reservoir		
Name	Yale Lake	
Drainage Area	596 square miles	
Maximum Storage Capacity @ El.	402,000 ac-feet	
Usable Storage Capacity	190,000 ac-feet	
Maximum Normal Elevation	490.0 feet msl	
Normal Summer Operating	490.0-480.0 feet msl	
Normal Minimum Operating	470.0 feet msl	
Minimum Operating Elevation	430.0 feet msl	
Minimum of Record	435.65 feet msl (February 1957)	
Minimum Pool	430.0 feet msl	
Dams		
Name	Yale dam	Saddle dam
Type	Zoned embankment	Zoned embankment
Height	323 feet	40 feet
Length	1,500 feet	1,600 feet
Instrumentation	Crest monuments Vee-notched weir Abutment piezometers	Downstream piezometers
Diversion Tunnel		
Size	30-foot diameter horseshoe shaped	
Length	1,530 feet	
Liner Type	Concrete	
Other Features	Concrete plug at 1,276 feet from outlet	
Future Intake		
Location	81 feet north of diversion tunnel plug	

Table A.2.0-1 Yale Project Data (continued)

Features currently present	Circular cofferdam and rock formation grouting	
Cofferdam Outside Diameter	76 feet	
Cofferdam Top Elevation	431.3 feet msl	
Intake Structure		
Width	95 feet	
Length	38 feet	
Height	100 feet	
Intake Invert Elevation	400 feet msl	
Gates		
Number	2	
Type	Roller bulkhead	
Size	13.33 x 17 feet	
Hoist Capacity	100 tons	
Instrumentation (monitoring discontinued since 1997 Part 12)	Tilt plates (2) Float wells	
Intake Fish Barrier Net		
Mesh Size	½ inch	
Length	700 feet	
Height	95 feet	
Penstocks		
Diameter	Varies-16 to 18.5 feet	
Length	1,111 feet (Unit 1) 1,206 feet (Unit 2)	
Liner Type	Unit 1	Unit 2
	Steel (985 feet) Concrete (126 feet)	Steel (1,093 feet) Concrete (113 feet)
Powerhouse		
Type	Semi-outdoor	
Width	151 feet	
Length	57 feet	
Draft Tube Gates		
Type	Slide	
Size	10' 1.5" x 17' 11"	
Gantry Crane		
Type	Outdoor	
Span	65 feet	
Main Hook Capacity	235 tons	
Auxiliary Hook Capacity	30 tons	
Draft Tube Gates Hoist Capacity	10 tons	
Spillway		
Type	Gated concrete ogee/chute	
Crest Length	195 feet	
Crest Elevation	460 feet msl	

Table A.2.0-1 Yale Project Data (continued)

Gates		
Number	5	
Type	Tainter	
Size	39 x 30 feet	
Fish Barrier Net	370 feet x 55 feet	½" mesh
Discharge Capacity	194,000 cfs (PMF) at pool elevation	
Tailrace	Lake Merwin	
Plant Access Road		
Length	2.2 miles (from State Route 503)	
Surface Type	Asphalt/gravel	
Concrete bridge over spillway chute	110 foot span	
MECHANICAL SYSTEMS		
Turbine		
Unit Number	1	2
Manufacturer	S. Morgan Smith/ American Hydrorunner	S.Morgan Smith/American Hydrorunner
Turbine Capacity	73,300 kW at 240 feet	73,300 kW at 240 feet
Maximum Turbine Discharge	4,820 cfs at 240 feet	4,820 cfs at 240 feet
Maximum Turbine Output	86,800 kW at 240 feet	86,800 kW at 240 feet
Type	Vertical Francis	Vertical Francis
Speed (nameplate)	150 rpm	150 rpm
Runner Discharge Diameter	144 inches	144 inches
Wicket Gate Circle Diameter	173 inches	173 inches
Wicket Gate Height	32.25 inches	32.25 inches
Distributor Centerline Elevation	236.0 feet msl	236.0 feet msl
Draft Tube Type	High moody spreading- cone	High moody spreading- cone
Year Disassembled and Overhauled	1986 turbine overhaul 1996 turbine overhaul, runner replaced	1987 turbine overhaul 1995 turbine overhaul, runner replaced
Governor	Woodward cabinet	Woodward cabinet
Piezometer Taps		
Spiral Case Inlet	4-1/4" Orifices	4-1/4" Orifices
Winter-Kennedy	4-1/4" Orifices	4-1/4" Orifices
Lube Oil Systems	Turbine guide bearing Thrust/generator lower guide bearing Upper generator guide bearing	Turbine guide bearing Thrust/generator lower guide bearing Upper generator guide bearing
High-Pressure Lift System	Yes	Yes
Cooling and Service Water System	Generator cooling Thrust bearing cooling Seal water	Generator cooling Thrust bearing cooling Seal water
Draft Tube Depression System	Yes	Yes

Table A.2.0-1 Yale Project Data (continued)

Compressed Air System		
Compressors		
Number	2	
Manufacturer/Model No.	Gardner-Denver/WBE 1006	
Speed	870 rpm	
Number of Cylinders	2	
Motors		
Type	Induction	
Manufactured/Model	GE/5K 1445BX4	
Capacity	40 hp	
Speed	875 rpm	
Air Receivers		
Number	2	
Volume	110 cubic feet (each)	
Plant Drains and Dewatering System		
Plant Sump Dimensions, (LxWxH)	7.5' x 13' x 48'	
Sump Pumps		
Number/Type	1/Vertical	
Capacity	1,000 gpm	
Motor	25 hp	
Dewatering Pumps		
Number/Type	2/Vertical	
Capacity	5,000 gpm (each)	
Motor	125 hp	
Oil Separation Provisions	None	
Domestic Water and Sanitary Waste System		
Domestic Water	Chlorinated Service and Cooling Water	
Water Heater Number/Capacity	1-80 gallons 1-25 gallons	
Sanitary Waste Treatment	3,000 gallon septic holding tank	
Fire Detection and Protection		
Plant Fire Detection System	None	
Generator Fire Suppression System	Carbon dioxide (bottles removed)	
Plant Interior Fire Protection System	None	
Sire Fire Protection System	None	

Table A.2.0-1 Yale Project Data (continued)

HVAC System		
Heating		
Powerhouse	Rejected generator heat	
Control Room	Electric heater	
Ventilation		
Powerhouse	Natural circulation	
Generator Cover	Ventilation fans	
Air Conditioning		
Control Room	Window unit	
Lube Oil Filtration System		
Filter Type	Bowser Figure 7D Multi-compartment	
Oil Storage Tank Capacity	9,000 gallons	
ELECTRICAL SYSTEMS		
Generator		
Unit Number	1	2
Manufacturer	General Electric	General Electric
Rating		
kVA at 60 C	74,400	74,400
Power Factor	0.90	0.90
Insulation Class		
Stator	F	F
Field	B	B
Generator Capability		
kVA	74,400	74,400
kW at 0.90 PF	67,000	67,000
Temperature Rise, C, Stator	75	75
Temperature Rise, C, Field	80	80
Year Installed	1952	1952
Year Disassembled and Overhauled	1986-Rewind	1987-Rewind
Exciter		
Manufacturer	ABB Model Unitrol "P"	ABB Model Unitrol "P"
Static Excitation System	325 kW at 250 V dc	325 kW at 250 V dc
Bus Duct		
Type	Non-segregated	Non-segregated
Rating, amp/phase	4,000	4,000
Generator Breakers	SF_6 (1992)	SF_6 (1992)

Table A.2.0-1 Yale Project Data (continued)

Protective Relays	General Electric	
480 Volt System	Switchgear Station control centers Headgate load center Spillgate load center	
120 Volt System		
Transformers		
Type	Dry/Single Phase	
Voltage	480-120/240 volts	
Rating, kVA	37.5 (Powerhouse 2 total); 15 (Headgate); 15 (Spillways)	
Panelboards	120/240 V	
DC System		
Battery		
Number of Cells	60	
Voltage, V	125 dc	
Rating, amp-hr	240	
Number of Chargers	1 @ 50 amp 1 @ 25 amp	
Panelboard	120 V dc	
Emergency Generator		
Type	Propane Engine	
Voltage	480 volts	
Rating	100 kW	
Transformers		
Station Service Transformers		
Type	Oil-fill/three-phase	
Number	2	
Rating	1,750 kVA (Auxiliary No. 1) 3,750 kVA (Auxiliary No. 2)	
Voltage	13,800/480 volts	
Generator Step-up Transformers		
Number	4 (includes one spare)	
Type	Oil-filled/single/phase	
Rating	138,000 kVA	
Voltage	13,200/115,000 volts	
Manufacturer	General Electric	
Year Installed	1953	
Lighting	Incandescent and fluorescent lamps	
Plant Control and Instrumentation System	Landis and Gyr LG 6800 MODICON PLC	
Communication System	Analog Microwave	
Security	Fencing Locked gates and doors/video cameras	

A.2.1 Civil Systems

A.2.1.1 Reservoir

The reservoir formed by Yale Dam (Yale Lake) is approximately 10.5 miles long and has a surface area of 3,800 acres at elevation 490 feet msl, the normal maximum operating level of the reservoir. The reservoir's gross storage capacity at this elevation is 402,000 acre-feet with a usable storage capacity of 190,000 acre-feet. The drainage area for the reservoir is 596 square miles.

A.2.1.2 Dams

A.2.1.2.1 Yale Dam

The main dam for the project is a zoned embankment resting on bedrock with a crest length of 1,305 feet and a maximum height of 323 feet. The embankment consists of an upstream sloping central impervious core supported by sandy gravel shells. The upstream surface slope of the dam is 2.5 horizontal to 1 vertical, and the downstream slope is 2 horizontal to 1 vertical. The dam crest is at elevation 503 feet msl. A concrete arch section is provided at the downstream toe to limit the downstream extent of the dam and permit the powerhouse to be located approximately 150 feet closer to the intake. The arch section is 77 feet high and composed of concrete arch rings.

The instrumentation at the main dam monitors vertical crest movements, seepage flows, and piezometric pressures in the left abutment. Twelve monuments along the crest of the dam are surveyed annually by PacifiCorp to monitor dam settlement. Yale Dam and left abutment seepage flows are measured at the vee-notched weir near the powerhouse. Five piezometers are used to monitor the piezometric levels in the left abutment of the dam.

A.2.1.2.2 Saddle Dam

Saddle Dam is located about 0.25 mile north of the main dam on the right bank. This dam is constructed on a sandy clay layer overlaying an alternating sequence of sandy gravel, sandy clay, and sand and consists of a central impervious core with random fill in the outer shell sections. The saddle dam is 1,600 feet long with a maximum height of approximately 40 feet and 3 horizontal to 1 vertical side slopes. The dam crest is at elevation 503 feet msl. The upstream slope is protected from erosion by a 2 to 3-foot layer of riprap, while the downstream slope has a grass surface.

A.2.1.3 Diversion Tunnel and Future Intake

A.2.1.3.1 Diversion Tunnel

To implement the construction of the main dam, river flows were diverted past the project through a concrete-lined, 30-foot-diameter, horseshoe-shaped tunnel beneath the right portion of the dam. The diversion tunnel is 1,530 feet long and excavated in rock approximately 90 feet below the base of Yale Dam.

The headworks of the tunnel include an approach channel, approximately 200-feet-long and 100-feet-wide, and a gated inlet structure for control of the river flow to the diversion tunnel during construction of the dam. The inlet structure is constructed of reinforced concrete, has an invert at elevation 245 feet msl, and contains two 16-foot-wide by 23-foot-high closure gates and two 4-foot-wide by 5-foot-high inlet bypass gates. The gated inlet structure section of the diversion tunnel transitions into the 30-foot-diameter, horseshoe-shaped diversion tunnel approximately 60 feet downstream of the tunnel entrance.

The main portion of the diversion tunnel is lined with concrete a minimum of 1 foot thick. The tunnel is plugged at the location of the dam’s grout curtain approximately 1,276 feet from the tunnel outlet with a 30-foot-long section of concrete. The rock formation along the tunnel upstream of the plug is also pressure grouted. The tunnel outlet discharges into an open channel adjacent to the end of the spillway concrete apron. The open channel is approximately 50 feet wide and 320 feet long and intersects the main river channel approximately 400 feet downstream from the powerhouse.

A.2.1.3.2 Future Intake

The original project construction included a circular foundation and cofferdam for potential expansion of the project in the future. The center of the future intake is approximately 81 feet from the centerline of the diversion tunnel near the tunnel plug.

The foundation and cofferdam are constructed of reinforced concrete and consist of a ring beam founded on rock with outside and inside diameters of 76 and 64 feet, respectively. The top of the ring beam is at elevation 380 feet msl. The ring beam supports a circular wall that forms the upper portion of the cofferdam. The circular wall has an outside diameter of 76 feet and varies in thickness from 12 to 18 inches. The top of the wall extends to elevation 431.3 feet msl, 1.3 feet above the reservoir’s low water level.

Construction for the future intake also included pressure grouting the rock formation below the cofferdam and between the cofferdam to an area downstream of the diversion tunnel plug. Grouting of the rock formation would control groundwater inflow during construction of the future intake structure and connecting tunnel to the existing diversion tunnel.

A.2.1.4 Intake Structure

A.2.1.4.1 Structure

The intake structure is on the left bank of the reservoir near the left abutment of the main dam crest. The intake structure is accessible from a bridge that extends from the plant access road to the structure. The vertical concrete and steel-framed structure is 95 feet wide and 38 feet long. Full height trashracks screen the flow to the turbines, and 2 roller bulkhead gates are provided for dewatering the 2 parallel penstocks constructed in the left abutment. The trashracks are composed of 10-foot by 8-foot steel-framed, removable panels with 2.5-inch by 3/8-inch bars spaced on four-inch centers. The concrete deck of the intake structure is at elevation 500 feet msl and is designed for a 150 pound/square foot live load or an H-20 truck load. The two 17-foot by 13.33-foot rectangular openings to the penstocks at the bottom of the structure have an invert at elevation 400 feet msl, which is 90 feet below reservoir's maximum operating level. An access well and air inlet are also provided downstream of each gate.

Instrumentation at the intake structure allows monitoring of structure movement and reservoir levels. Two tilt plates are installed on the structure to record any deflections which may occur. Float wells are also installed at the intake structure to measure the reservoir level and the differential head across the trashracks. The recorded water levels are wired to the Yale powerhouse control room for observation by the plant operators. No mechanical trash cleaning equipment is installed at the intake structure.

A.2.1.4.2 Gates and Hoists

The intake structure is equipped with two 13.33-foot wide by 17-foot high roller bulkhead gates. The gates are constructed with structural steel members filled with concrete for ballast. The gates are hoist-operated and are used to dewater the penstocks for inspection and maintenance purposes. When the gates are not closed, they are suspended directly above the penstock openings.

The intake structure bulkhead gates are raised and lowered with 100-ton hoists driven by 20 hp motors at a speed of 2 fpm. Each hoist system is designed for outdoor service and is supported from a fixed, structural steel-framed gantry located at each gate slot approximately 30 feet above the intake structure deck. Hoist operation can be controlled locally or remotely from the powerhouse. The hoists have recently been rehabilitated and are in good working condition. The intake structure gate and hoist systems are designed to operate under full unbalanced conditions with the reservoir water level at elevation 490 feet msl.

A.2.1.4.3 Intake Fish Barrier Net

A fish barrier net with ½-inch mesh is located upstream of the intake to reduce entrainment of federally listed fish in the flow through the powerhouse. The net spans approximately 700 feet from a rock anchor on the reservoir bank upstream of the left abutment to a cast-in-place concrete anchor on the crest of the dam. The height of the net is 95 feet near the center of the span. The bottom of the net is weighted by a steel chain and is anchored by six 3,600-pound concrete blocks spaced 50 feet apart. The net is supported by foam-filled floats and is fixed in position.

A.2.1.5 Penstocks

Water is delivered from the reservoir to the generating units via two penstocks originating at the intake structure and terminating at the turbine spiral cases in the powerhouse. The penstock for Unit 1 is 1,111 feet long, while the penstock for Unit 2 is 1,206 feet long.

The penstocks for the Unit 1 and 2 turbines were originally lined with a 16-foot-diameter steel liner which extended upstream for 282 feet and 247 feet, respectively. The remainder of each penstock is concrete-lined with an internal diameter of 18.5 feet. The steel liners were subsequently extended in both penstocks, and the length of the Unit 1 penstock steel liner is 985 feet, while the steel liner for Unit 2 is 1,093 feet. The diameter of the steel liners varies between 16 and 18 feet with the majority of the extension having an 18-foot-diameter.

The centerline elevations for the penstocks are 409.25 feet at the intake and 236 feet at the powerhouse. The penstocks are horizontal at the intake and extend about 100 feet before dropping at a 9% grade for about 650 feet (measured horizontally). The penstocks then slope at a 52% grade for about 225 feet (measured horizontally) to connect to a 200-foot horizontal section which terminates at the turbine spiral case.

The penstocks are accessible through an 8-foot-high by 10-foot-wide by 110-foot-long access tunnel located at about the midpoint of each penstock. The access tunnel entrance is located on the left abutment immediately downstream of the dam at elevation 340 feet msl. The tunnel is accessible from the powerhouse by a road that crosses the downstream slope of the dam.

A.2.1.6 Powerhouse

A.2.1.6.1 Structure

The powerhouse is parallel to the river on the left bank immediately downstream of the concrete arch which forms the toe of the dam. The concrete, semi-outdoor type structure is 151 feet long and 57 feet wide and houses 2 turbine generator units.

The design and construction of the powerhouse included provisions for the future addition of two similar units downstream. The foundation for the future addition was completed up to elevation 205 feet msl during initial construction.

The turbine floor (elevation 244 feet msl) provides access to the turbine pit and to the lower powerhouse galleries that access the penstocks and draft tubes. The turbine floor also provides space for the turbine generator auxiliary systems including cooling water, compressed air receivers and piping, and station drainage. The powerhouse operating floor (elevation 257 feet msl) is at ground level and provides access to the generators and control room. The operating floor level also includes the governor, motor control center, air compressors, and draft tube depression system controls as well as toilet and locker room facilities and a laydown area for unit maintenance. The roof (elevation 274.5 feet msl) contains hatches for the outdoor gantry crane to access the laydown area, turbine generator units, and the turbine floor level.

The powerhouse is provided with draft tube gates for dewatering the turbine water passageways. The draft tube gates are 10.125 feet high by 17.9 feet wide and are raised and lowered by the gantry crane hoist. The draft tube gates weigh approximately 13,000 pounds each and are designed to be installed or removed under balanced water conditions. Under normal turbine operating conditions, a 20,000-pound concrete cover beam is placed over the slots to seal the draft tube, and the draft tube gates are dogged off above the draft tube for storage.

A.2.1.6.2 Gantry Crane

The powerhouse facility includes an outdoor type, traveling gantry crane for unit maintenance and raising and lowering the draft tube gates. The crane spans 65 feet across the powerhouse and has main and auxiliary hook capacities of 235 and 30 tons, respectively. A 10-ton hoist is also provided on the downstream end for handling the draft tube gates and concrete draft tube slot cover beams. Crane rails, approximately 195 feet long, allow the gantry crane to travel the full length of the powerhouse and the adjacent unloading area.

A.2.1.7 Spillway

A.2.1.7.1 Structure

The concrete gravity, chute type spillway adjoins the right abutment of Yale Dam. The spillway is 1,650 feet long. The length of the spillway is comprised of a 400-foot ogee and transition section, a 650-foot rectangular concrete chute on a 10% grade, and a 600-foot section of exposed bedrock. The concrete gravity ogee section has a crest at elevation 460 feet msl. The spillway discharges into the river about 1,200 feet downstream of the powerhouse. The downstream section of the spillway is formed in the exposed bedrock and is used for energy dissipation.

A spillway bridge provides access to the dam and powerhouse. The bridge is a steel- framed structure with a reinforced concrete deck and is supported by the spillway piers. The bridge is approximately 250 feet long with a deck at elevation 502.75 feet msl and is currently posted as having a 20-ton limit. The design loads used for the bridge were based on 1 of the following conditions:

Lorain MS-254 W Crane Unit loaded with 10 kips on a 30-foot boom at a 20-foot radius; or H-20 Highway Loading, 1 truck on any span, with a 30 percent impact included.

A.2.1.7.2 Gates and Hoists

The spillway is equipped with five 39-foot-wide and 30-foot-high motor-operated Tainter gates. Each gate is controlled by a 5 hp motor and is powered from the station service power supply. The spillway gates can be controlled locally or remotely from the Yale powerhouse or the Merwin Control Center. A propane engine type generator, set rated at 60 kW, is installed in a small building adjacent to the spillway to automatically start and provide power for gate operation if the station service power supply is interrupted.

A.2.1.7.3 Spillway Fish Barrier Net

A barrier net is located upstream of the spillway to reduce entrainment of federally listed fish during low-volume spill flows. The net spans the spillway from a rock anchor on the reservoir bank upstream of the right abutment to near the end of a concrete training wall at the left of the spillway. The net is secured to the reservoir bottom by drilled and grouted rock anchors spaced at 25 feet. The net is supported by floats that are supplied by air from a compressor rated at 10 cubic feet per minute located in the spillway control building on the dam. The net is normally maintained in the raised position and it is designed to pass flows up to 6,000 cubic feet per second. At higher flows, the air is released from the floats to lower the net to a submerged position. The valves controlling the supply of air to the net can be operated remotely from the Merwin Control Center or locally at the spillway.

A.2.1.8 Tailrace

The powerhouse tailrace is formed by the upper reach of Lake Merwin. The tailrace channel is approximately 3 miles long before it opens up into the main body of Lake Merwin. The Merwin dam and powerhouse are approximately 14.5 miles downstream of the Yale powerhouse.

The tailrace channel is naturally rock lined and approximately trapezoidal in shape. The invert of the channel at the powerhouse is about 208 feet and water flows from east to west. The draft tube discharge enters the tailrace perpendicular to the tailrace. At the maximum tailwater level for 2 unit operation under normal conditions, the tailrace water surface is about 210 feet across and the depth is approximately 32 feet.

A.2.1.9 Plant Access Road

The Yale Project is located about 2.2 miles east of State Highway 503. A new access road and bridge crossing the lower end of the spillway chute were constructed in 1998. The access road to the project is paved for a distance of about 1.7 miles from the highway and the remaining portion is gravel surfaced. The gravel surface is scheduled to be chip- sealed in 1999. The original powerhouse access road crossed the spillway bridge and main dam crest, wound around the hill above the powerhouse, and approached the powerhouse from the downstream side; it is barricaded and no longer in service. Access to the powerhouse is currently provided on the downstream face of the main dam and begins in the vicinity of the spillway bridge. This route was formerly used as emergency access to reach the powerhouse and spillway gates. A gravel surfaced parking area is provided at the powerhouse for employees and visitors.

Access to the Saddle dam is provided by a second 0.75-mile-long paved road branching off the project access road at a point approximately 1 mile from State Highway 503.

A.2.1.10 Future Bull Trout Passage

Bull Trout fish passage facilities are planned for two locations as described below.

A.2.1.10.1 Future Upstream Bull Trout Passage – Yale Tailrace

The Upstream Bull Trout Passage Facility will be located at the upstream end of the Merwin Reservoir attached to the far downstream end of the powerhouse. Access to the trap is across the powerhouse deck adjacent to the tailrace. This trap purpose is to capture upstream migrating bull trout for truck transport around Yale Dam.

The trap is a concrete structure that consists of a series of three pools leading to a hopper pool. An adjustable “V” gate leads from the upstream most pool, Pool 2, into the Hopper Pool. A refuge box within the Hopper Pool fabricated from pickets with a 1-inch clear protects small fish. The hopper is intended to be raised to a level such that the water level in the hopper is raised 40 inches above the powerhouse deck to allow bull trout to be netted from the hopper and placed into a tote for transport to transport truck. After removal of bull trout, the hopper can be raised to access a slide gate mounted on the bottom of the hopper which leads to an 8-inch diameter hose which has a release point into a second hopper. Non-transported fish can be released into this hopper which is then lowered into the Yale tailrace for release of fish via trap door on bottom of the hopper.

Flow is regulated into the trap through baffled diffuser gratings located in the bottom of the Hopper Pool and Pool 2. The pump sump is fed by two cylindrical screens that comply with National Marine Fisheries Service and US Fish and Wildlife Service criteria (NMFS Anadromous Salmonid Passage Facility Design, 2011 – Sections 11.1 through 11.8). A hoist and track system allows the screens to be pulled up to the deck level for maintenance.

A.2.1.10.2 Future Downstream Bull Trout Passage – Yale Forebay

The Downstream Bull Trout Passage facility is located adjacent and upstream of the intake structure for the Yale Powerhouse. Facility purpose is to collect downstream migrating bull trout for truck transport downstream of Merwin Dam. The facility is a “Merwin” type trap.

The trap consists of a series of nets and net pens fabricated out of 0.5 inch nylon mesh. The exclusion net blocks fish from entering the Yale intake. A lead net connected to the exclusion net guides intercepted fish into the trap through a “V” type opening. Fish then pass into the pot section of the trap then through a small opening into a spiller section of the trap which is a holding net pen. A refuge box fabricated from pickets with a 1-inch clear spacing is located within the holding pen to protect small fish.

A.2.2 Major Mechanical Systems

A.2.2.1 Turbine

The Yale powerhouse contains 2 vertical Francis turbines, manufactured by S. Morgan Smith Company and installed in 1953.

The original rating of the turbines was 80,500 hp at 250-foot net head and 150 rpm. The Unit No. 2 and No. 1 turbine runners were replaced in 1995 and 1996, respectively. Runner replacement increased each turbine's capacity to 73,300 kW (98,250 hp) at a net head of 240 feet. Unit speed remains the same at 150 rpm.

The Unit No. 2 turbine-generator set has a peak efficiency of 89.1 percent at 73 MW (82 percent wicket gate position). This is an increase in unit efficiency of 7.1 percent over the previous runner at the respective maximum efficiency point. In addition, the maximum output of the unit increased by 17.5 MW (an increase of 27.2 percent) from 64.3 MW to 81.8 MW. The ability to pass additional flow through the unit increased from 4,239 cfs to 4,820 cfs (at a net head of 240 feet) at maximum wicket gate opening. The new turbine runner exceeds both the manufacturer's contractually guaranteed turbine output and the turbine efficiency guarantees.

A formal acceptance test was not performed on Unit No. 1 following installation of the new runner. A comparison of the 2 identical runners was made by observing the gate position, outputs, and flows of both units during operation. In this manner it was confirmed that both runners are identical and are performing with similar capabilities and efficiencies. Performance tests have been conducted on Yale Unit No. 2 to determine the actual performance of the replacement runner during commissioning of the unit.

Each turbine is provided with a carbon steel spiral case and elbow moody draft tube, both with man doors for maintenance access. The turbine distributor includes the cast steel stay ring having 20 vanes, 20 cast carbon steel wicket gates, embedded fabricated steel discharge ring, carbon steel fabricated head cover, gate ring, and gate mechanism operated by 2 double-acting servomotors. A shell type oil-lubricated guide bearing and mechanical packing box are supported on the head cover. The turbines are designed to operate in air with the draft tube depressed as a synchronous condenser or motor and are provided with piping and systems for runner seal cooling water. Each turbine pit is provided with a gravity drain through a stay vane to drain leakage water to the station sump.

A.2.2.2 Governor

A Woodward cabinet actuator style mechanical hydraulic governor is provided to serve Units 1 and 2. Governor systems for both units are housed in a single cabinet between the 2 units. The governor systems are normally operated as one common system but can be operated as separate systems. Two 150-gpm horizontal rotary gear type hydraulic pumps driven by 40-hp motors maintain pressure in two 900-gallon pressure tanks. Nominal system pressure is 300 psi. A permanent magnet generator (PMG) mounted on top of the generator provides the speed signal to the governor. Trip and reset speeds are 187 rpm and 157 rpm, respectively (per Woodward drawings). A speed switch which closes at 30 rpm is also located in the PMG, and a second speed switch is used to lock out the creep detection circuits.

The governor is provided with the following controls and instruments:

Controls	Instruments
Speed droop control	Tachometer
Gate limit control	Air brake pressure gauge
Speed adjust control	Oil pressure gauge
Air brake control	Gate limit and position indicator
Transfer valve	Speed adjust position indicator
Isolating valve	Isolating valve indicator
Oil pump echelon	Oil level gauge
Oil pump continuous/intermittent	
Creep detector	

A manually operated water-driven emergency oil pump can be used to close the turbine wicket gates in the event of loss of oil pressure.

A.2.3 Major Electrical Systems

A.2.3.1 Generator

The Yale generators were manufactured by General Electric and installed in 1953. Each generator was originally rated at 60,000 kVA, 13,200 V, 60º C maximum temperature rise and was capable of 115% continuous overload to 69,000 kVA. The generator rotors and stators were originally constructed with Class B insulation, which insulation has a limiting temperature rise of 80 C. The generator stators have been rewound with Class F coil insulation, and are rated at 74,400 kVA at 60 C. The limiting temperature rise for the stator Class F insulation is 75º C. A generator heat run test conducted in 1991 indicated that the 80º C field temperature limit is reached at a generator output of 80,000 kVA, while the stator temperature at 80,000 kVA is approximately 50º C. Therefore, the generator output is limited to 80,000 kVA by the existing field windings, although the stator windings have additional capability. Based on the heat run test, the generator can be operated up to the following output levels without exceeding the temperature limits:

kVA	Power Factor	kW
80,000	1.00	80,000
80,000	0.95	76,000
80,000	0.90	72,000

The Yale generators are vertical, recirculating, air-cooled units with single-pass water coolers.

A.2.3.2 Exciter and Automatic Voltage Regulator

The main and pilot exciters and the automatic voltage regulators, manufactured by General Electric, were installed in 1953. They were replaced in 1996 and 1995, respectively, with ABB 325 kW at 250 Vdc Excitation Systems.

These systems have automatic voltage regulators and power system stabilizers. The maintenance schedule for the automatic voltage regulator is the same as that for the exciters.

The non-segregated phase bus duct was manufactured by General Electric and was installed in 1953. It is rated at 3,000 amperes per bus.

The plant is equipped with 2 runs of 3,000-ampere bus duct. The non-segregated phase bus duct is in good condition. A section of bus duct was open during a recent site inspection. The bus duct enclosure was free of debris, and the exposed section of bus duct appeared to be in good condition. This bus duct was upgraded with the new turbine runner to 4,000 amperes.

The original oil-filled generator breakers were replaced in 1992 with new SF6 breakers manufactured by ABB and rated at 4,000 amperes, 13.8 kV. The new breakers are operating satisfactorily.

A.2.3.3 Transmission Line

The Yale Project includes a single 115 kilovolt (kV) primary transmission line that extends 10.5 miles to connect the Yale substation with an interconnected transmission system near the Merwin plant (Figure A.2.3-1).

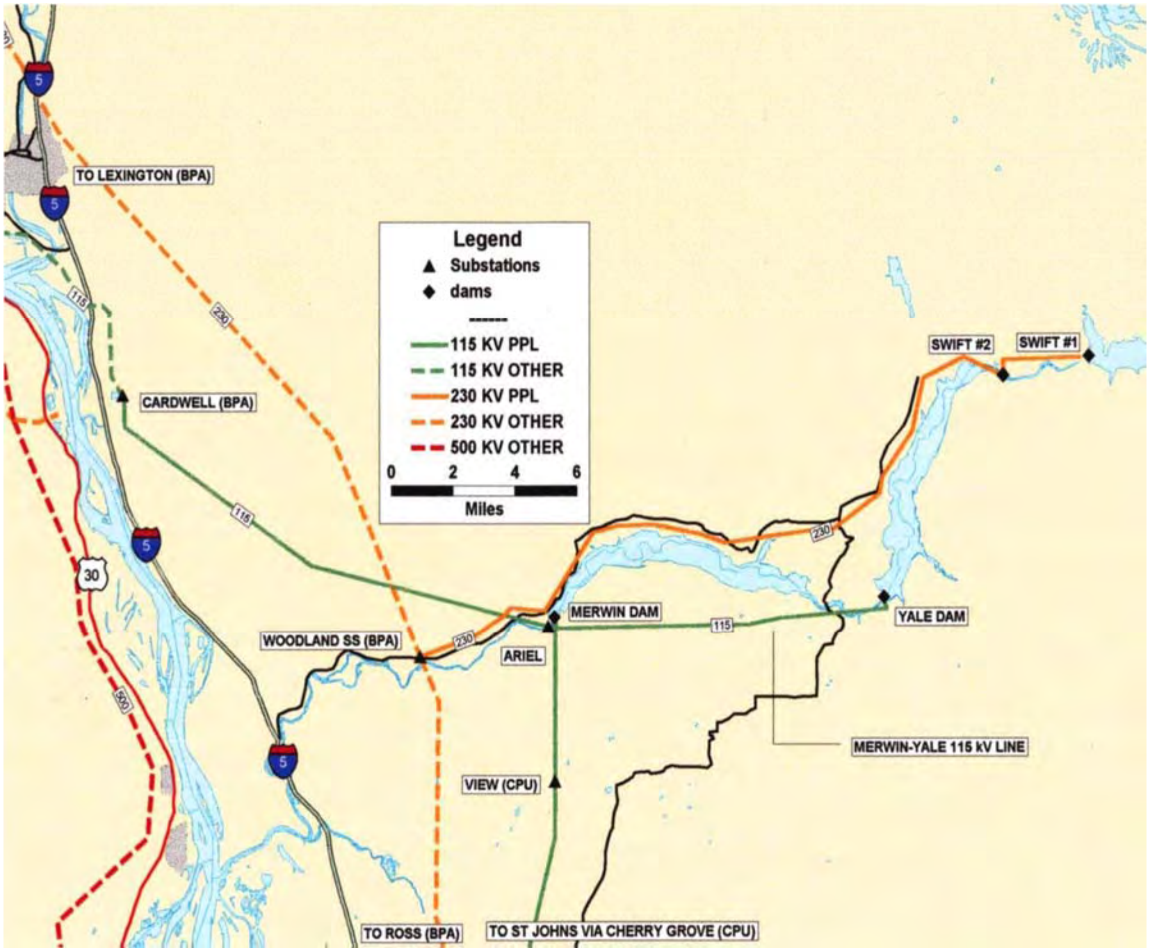

Figure A.2.3-1 Yale Project Transmission Line

A.3.0 Proposed Changes to Project Facilities

~~PacifiCorp has studied the feasibility of upgrading the existing project auxiliary equipment and systems to improve plant reliability, operation, and safety. Several upgrades have been made since 1995, following completion of the resource utilization study (Black & Veatch 1995). These upgrades are listed in Table C.2.0-2 of Exhibit C. No additional changes to major project facilities which would affect plant output are currently being considered.~~ At this time, PacifiCorp is not proposing any major modifications or upgrades. However, the Company will continue to evaluate the potential for project upgrades and modifications as future market and other conditions change to ensure the most cost-effective, efficient and environmentally balanced use of the water resources available.

A.4.0 Lands of the United States

Federal lands (public lands and reservations of the United States) within the Yale Project boundary total 202.9 acres. Of those acres, 38.7 acres are managed by the Bureau of Land Management

(BLM); this includes approximately 2.4 acres that are occupied by Project transmission lines. The remaining 164.2 acres are lands that are managed by the State of Washington and Clark County, subject to Section 24 of the Federal Power Act. Federal lands are identified as:

- Part of the NW 1/4 of the NE 1/4 of Section 32, Township 6N Range 4E, WM, totaling 38.7 acres (BLM; 2.4 acres of transmission line and 36.3 acres of non-transmission line)
- Part of the NE 1/4 of Section 21, Township 6N Range 4E, WM, totaling 111.8 acres (Clark Co., Section 24)
- Part of the E 1/2 of the SE 1/4 of Section 34, Township 7N Range 4E, WM, totaling 52.4 acres (State of Washington, Section 24)

A.5.0 Literature Cited

Black & Veatch 1995. Resource Utilization Study. Yale Hydroelectric Project

(FERC No. P-2071). Prepared for PacifiCorp, Portland, Oregon.

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EXHIBIT C – PROJECT INSTALLATION AND PROPOSED SCHEDULE

**Yale Hydroelectric Project
(FERC No. P-2071)**

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List of Tables

C.1.0 Introduction

This Exhibit C identifies project installation and proposed schedule. Because PacifiCorp seeks a non-capacity amendment and consistent with 18 CFR 4.201(c), only the information impacted by the proposed amendment is included.

C.2.0 Construction History

C.2.1 General Description

The Yale Hydroelectric Project is one of three PacifiCorp projects located on the North Fork of the Lewis River, approximately 28 miles east of Woodland, Washington and 53 miles northeast of Portland, Oregon. The Project site is 34 miles upstream of the confluence of the North Fork Lewis River with the Columbia River. The Yale Project is one of four facilities on the Lewis River. The other three projects are Swift No. 1 (FERC Project No. 2111), Swift No. 2 (FERC Project No. 2213) and Merwin (FERC Project No. 935). The Merwin Hydroelectric Project is located at RM 19.5, the Swift Hydroelectric Project No. 2 is located at RM 44, and the Swift Hydroelectric Project No. 1 is located at RM 47. Swift No. 1, Yale and Merwin are owned and operated by PacifiCorp. Swift No. 2 is owned by the Cowlitz County Public Utility District No 1 (Cowlitz PUD) and maintained and operated by PacifiCorp under contract.

C.2.2 Historical Overview

Investigation of the power production potential of the Lewis River date back to at least 1909 and site explorations were started as early as 1914. Northwestern Electric Company, a predecessor of Pacific Power and Light (PP&L), obtained a preliminary permit from the Federal Power Commission (FPC) to investigate the Yale Project site in 1922. In late 1928, Northwestern Electric Company filed an expanded application for a preliminary permit with the FPC to investigate a comprehensive development of four sites on the Lewis River: Ariel, Basket, Swift and Muddy Creek. Three of the 4 projects have been constructed and are now known as, respectively, Merwin, Yale, and Swift No. 1 and Swift No. 2 (initially proposed as a single project). The fourth project, Muddy, is no longer being considered for development.

C.3.0 Proposed Changes to Project Facilities

As part of this application for license amendment, PacifiCorp will construct the Yale Downstream and Yale Upstream Bull Trout Fish Collection Facilities. The downstream facility will be located in the forebay to the Yale Powerhouse intake, just upstream of Yale dam and within the project reservoir. The upstream facility will be located at the Yale Powerhouse, collecting fish from the project tailrace area.

Facility design, permitting and construction are key components of the project each needing the appropriate amount of time to complete. Table C.3.0-1 provides the proposed schedule of development and construction for the Yale Downstream Bull Trout Fish Collection Facility. Given the uncertainty of when the FERC will issue an Order Amending License, the schedule is identified in time after Order issuance. In general, schedule will provide for construction and initiation of operation of facility by January 1, 2021 as identified in the US Fish and Wildlife Service

April 12, 2019 preliminary determination letter.

Table C.3.0-1. Proposed Schedule of Development and Construction for Yale Downstream Bull Trout Fish Collection Facility

Item	**Date**
Design	3 months of Order issuance
Permitting	6 months of Order issuance
Procure Contractor	7 months of Order issuance
Fabrication of materials	11 months of Order issuance
Construction of facility	12 months of Order issuance
Project Completion / In Service	January 1, 2021

Similar to the downstream facility identified above, facility design, permitting and construction are key components of the upstream facility project each needing the appropriate amount of time to complete. Table C.3.0-2 provides the proposed schedule of development and construction for the Yale Upstream Bull Trout Fish Collection Facility. Given the uncertainty of when the FERC will issue an Order Amending License, the schedule is identified in time after Order issuance. In general, schedule will provide for construction and initiation of operation of facility by

January 1, 2025 as identified in the US Fish and Wildlife Service April 12, 2019 preliminary determination letter.

Table C.3.0-2. Proposed Schedule of Development and Construction for Yale Upstream Bull Trout Fish Collection Facility

Item	**Date**
Design	1 year of Order issuance
Permitting	2.5 years of Order issuance
Procure Contractor	3.0 years of Order issuance
Fabrication of materials	3.5 years of Order issuance
Construction of facility	4 years of Order issuance
Project Completion / In Service	January 1, 2025

EXHIBIT D – COSTS AND FINANCING

Yale Hydroelectric Project
(FERC No. P-2071)

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List of Tables

D.1.0 Introduction

This Exhibit D is a statement of costs and financing. Because PacifiCorp seeks a non-capacity amendment and consistent with 18 CFR 4.201(c), only the information impacted by the proposed amendment is included. The cost of implementing the projects identified in the amendment will not materially affect the value of project power.

D.2.0 Capital and O&M Costs of Proposed Project Modifications and Resource Enhancement Measures (18 CFR 4.51(e)(3)-(4))

The non-capacity amendment seeks approval of activities related to the Services' preliminary determinations with regard to fish passage and necessary to any identical or substantially similar final determinations once the Services issue those, expected 2020. Implementing the determinations will require project modifications and resource enhancement measures. Detailed information regarding these project modifications and resource enhancement measures are included in the following documents:

- Merwin In-Lieu Strategic Plan
- Lewis River Basin Implementation Monitoring Plan
- Bull Trout Passage Plan

These documents are provided in Volume III of the application.

The estimated capital and O&M cost of the non-power resource enhancements is $54,747,000 (see Table D.2.0-1).

Table D.2.0-1. Capital and O&M Cost Estimates for Project Modifications and Enhancements

Project Costs (Escalated dollars in thousands)	
Category	**Costs** *
Aquatics	$54,747
Terrestrial	$0
Cultural	$0
Recreation	$0
Socioeconomics	$0
Flood Operations	$0
TOTAL	**$54,747**

* Based on 39-year analysis period beginning in 2020.

D.3.0 Annual Costs of the Project

The estimated levelized annual cost of operating the Lewis River Merwin, Yale and Swift No. 1 Hydroelectric Projects is presented in Table D.3.0-1. Estimated costs are provided for PacifiCorp's collective Lewis River Hydroelectric Development as the three projects are operated and maintained by a single operations/maintenance crew.

Table D.3.0-1. Estimated Annual Cost of Future Project Operations over a 40-year Period.

Description	Levelized Annual Cost (in thousands)*
CONTINUING OPERATIONS	
Sunk Costs	
Net Investment of $286 M	
Cost of Capital	$11,102
Income and Property Taxes	3,528
Depreciation and Amortization	6,639
Total Fixed Cost	$21,269
Capital	
Planned Investment of $1,040 M	
Cost of Capital	$11,818
Income and Property Taxes	4,364
Depreciation and Amortization	11,887
Total Fixed Cost	$28,069
O&M	
Operations and Maintenance of $758 M	$16,399
Subtotal	$65,737
IMPLEMENTATION COSTS	
Capital	
Planned Investment of $208 M	
Cost of Capital	$4,019
Income and Property Taxes	1,484
Depreciation and Amortization	3,087
Total Fixed Cost	$8,590
Lost Generation	$0
Operations and Maintenance of $117M	$2,533
Subtotal	$11,122
TOTAL	**$76,859**

* Based on a 39-year analysis with inflation

D.4.0 Sources and Extent of Financing and Annual Revenues

PacifiCorp has the resources for financing and sufficient annual revenues to provide for the current capital needs associated with the continued operation of the project and those needs associated with the license amendment. If additional financing is necessary, the capital will be financed using the company's traditional sources of debt and common equity.

Annual financial information is provided in our annual report to shareholders and in FERC Form 1.

EXHIBIT G – PROJECT MAP

Yale Hydroelectric Project
(FERC No. P-2071)

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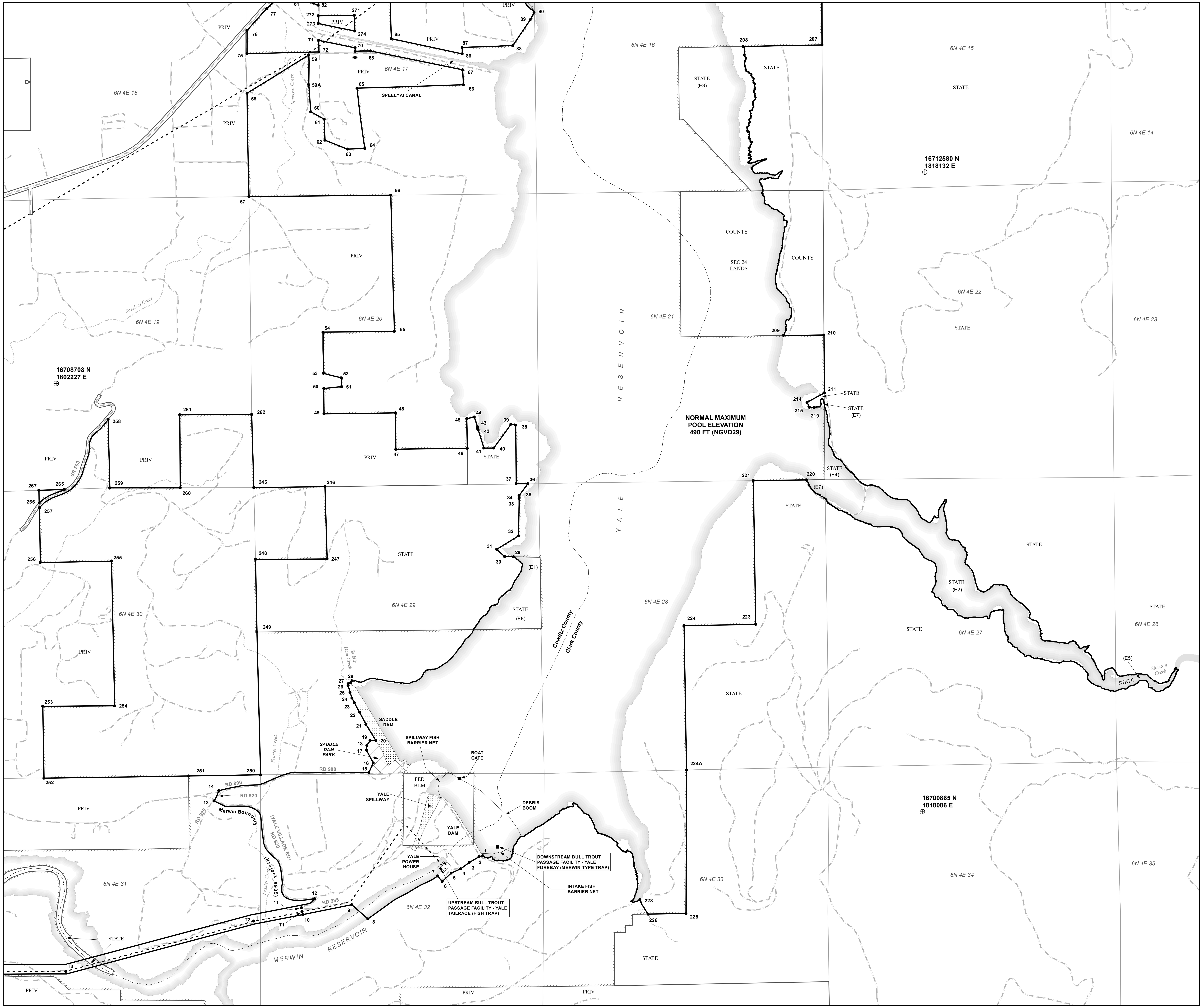
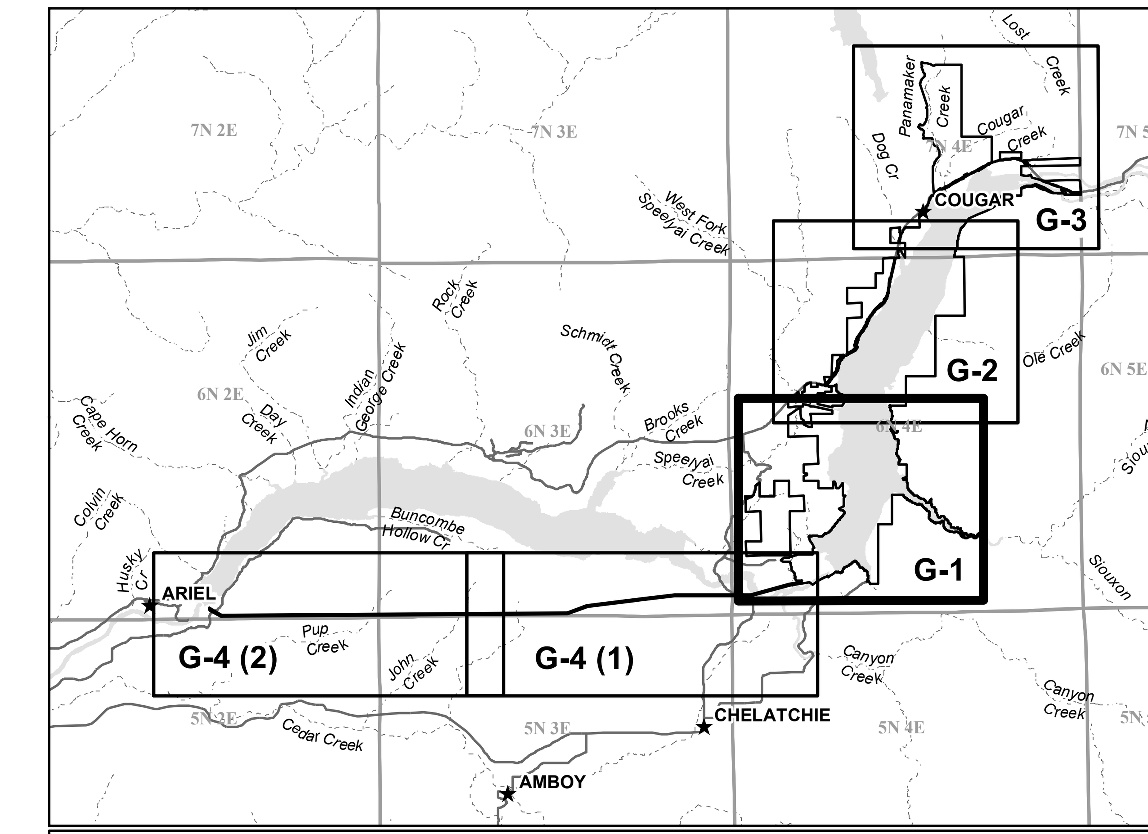
DESCRIPTION OF PROPOSED EXHIBIT G REVISIONS
YALE HYDROELECTRIC PROJECT (FERC NO. P-2071)
APPLICATION FOR LICENSE AMENDMENT

As part of the application for license amendment for the Yale Hydroelectric Project (FERC No. P-2111), PacifiCorp is proposing to revise the current Exhibit G drawings to include proposed facilities, such that all principal Project works necessary for operation and maintenance of the Project are identified within the exhibit drawings. No changes to the FERC Project boundary are proposed.

The revised Exhibit G drawings consist of a single sheet; Exhibit G-1, Yale Hydroelectric Project FERC No. P-2071 License issued June 26, 2008. It has been revised to include the Upstream Bull Trout Passage Facility – Yale Tailrace (Fish Trap) and Downstream Bull Trout Passage Facility – Yale Forebay (Merwin-Type Trap). Exhibit G-2 through G-4 (2) have no proposed modifications.





Location Map

State of Washington, Willamette Meridian

1:175,000

0 1 2 Miles

- ★ City
- ⊕ Reference Point *
- • Boundary Point **
- Road
- Trail
- Trail Begin/End
- PacifiCorp Transmission Line
- Project Boundary
- PacifiCorp Ownership
- Non-PacifiCorp Ownership
- Conservation Covenant
- Park or Campground
- PacifiCorp Facility
- County
- Stream
- Water Body
- Township/Range
- Section
- Lots

* Reference Point coordinates are in UTM Zone 10, NAD 83, US feet.
** Boundary Point numbers correspond to boundary description table.

I hereby state that the project boundary represented on this drawing is developed with reasonable accuracy in accordance with FERC requirements. Data has been developed by PacifiCorp's GIS department from a variety of sources including Federal, State, County, and PacifiCorp GIS sources including orthophotos. No field surveys were conducted. All reasonable efforts have been made to ensure that positional accuracy conforms to National Map Accuracy Standards for maps at 1:24000 scale.

Public Land Survey data are approximately located and are based on the Willamette Meridian. Property lines are approximately located.

MAP TEXT ABBREVIATIONS:

- SEC 24 = Section 24 Reservation under Federal Power Act
- FED = Federally Owned Land
- STATE = State Owned Land
- PRIV = Privately Owned Land
- BLM = Bureau of Land Management
- USFS = USDA Forest Service
- E# = Easement/Property Rights (see sheet G-6)

Federal land (public lands and reservations of the U.S.) included within the project boundary is 204.4 acres and consists of:

1)	BLM (transmission line)	2.4 acres
2)	BLM (non-transmission line)	36.4 acres
3)	Sec 24 (Clark County)	111.8 acres
4)	Sec 24 (State of Washington)	53.8 acres

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PacifiCorp has reviewed the Project boundary shown herein. PacifiCorp either owns in fee simple or possesses the flowage easements or property rights* for all lands drawn on this map that are inside the boundary.

* Property rights to be obtained/updated for areas shown as PacifiCorp Interest Lands.

NO	DATE	OLD FERC NO.	DESCRIPTION
1c	11/2019	P-2071-1007	Lewis River Bull Trout Passage Plan, SA Section 4.10
1b	10/16/08 & 11/6/15	P-2071-1007	Order on Rehearing (Lic. Art. 403 land acquisition & Order granting extension of time to submit rev. EXG)
0	05/28/2009		Order Approving Exhibits

Exhibit G - 1 Rev. 1c

Yale Hydroelectric Project FERC No. 2071
License Issued June 26, 2008

Project Boundary

Original Drawing Dated June 1, 2007
Scale as shown

1,000 500 0 1,000 2,000 Feet

N

July 2, 2020

FERC Drawing No. P-2071-1007

Yale Hydroelectric Project
FERC No. P-2071

Before the
United States of America
Federal Energy Regulatory Commission

Application for License Amendment

Volume II of V
Exhibit E – Environmental Report

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

July 2020

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Yale Hydroelectric Project
(FERC No. P-2071)

APPLICATION FOR LICENSE AMENDMENT

This application for license amendment for the Yale Hydroelectric Project (FERC No. P-2071) consists of the following volumes:

Volume I

Initial Statement
Exhibit A – Project Description
Exhibit C – Project Installation and Proposed Schedule
Exhibit D – Costs and Financing
Exhibit G – Project Maps

Volume II

Exhibit E – Environmental Report

Volume III

Appendices to Exhibit E

Volume IV

Exhibit F – Vicinity and Preliminary Design Drawings

Volume V

CONFIDENTIAL – Cultural Resource Summary for the Merwin, Yale and Swift No. 1 Projects

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EXHIBIT E – ENVIRONMENTAL REPORT

Yale Hydroelectric Project
(FERC No. P-2071)

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E.1.0 Introduction

In compliance with 18 CFR Part 4, Subpart L, PacifiCorp and Public Utility District No. 1 of Cowlitz County (Cowlitz PUD) (the "Utilities") are applying to the Federal Energy Regulatory Commission (FERC) for non-capacity amendments to the licenses for the Merwin Project (FERC No. 935), Yale Project (FERC No. 2071), Swift No. 1 Project (FERC No. 2111), and Swift No. 2 Project (FERC No. 2213) located on the North Fork of the Lewis River in Cowlitz, Clark, and Skamania Counties, Washington. The Merwin, Yale and Swift No. 1 Projects are owned and operated by PacifiCorp. The Swift No. 2 Project is owned by Cowlitz PUD and operated by PacifiCorp in coordination with the other Lewis River Projects. The Merwin, Yale, Swift No. 1, and Swift No. 2 projects are referred to as the "Projects." The current licenses for the Projects were issued on June 26, 2008 and expire on May 31, 2058.

Pursuant to 18 CFR 4.51, Exhibit E of this Application provides background information regarding applicable environmental resources and discusses the potential environmental effects of the proposed action. For the purposes of this non-capacity amendment, discussion is limited to those specific resource areas that may be affected by the proposed action. Because the proposed action is not expected to affect soils and geology, land use, or aesthetics, these sections are not addressed.

Within this document anticipated impacts of the proposed action are discussed both in terms of short-term and long-term effects. For the purposes of this discussion, short-term effects are defined as those effects that are temporary in nature and occur within the period of executing actions under the project. Long-term effects are those effects that persist or occur later in time beyond the immediate actions taken from the project.

E.1.1 Proposed Action

The Utilities seek non-capacity amendments to their licenses in response to the April 11, 2019 and April 12, 2019 preliminary determinations of the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS), respectively, regarding fish passage under Section 4.1.9 of the comprehensive relicensing settlement agreement among the Utilities, USFWS, NMFS, Tribes and other stakeholders ("Settlement Agreement"). In particular, subject to the Services' final determinations, the Utilities seek to amend their licenses and the incorporated fishway prescriptions to direct the following:

- Implementing a habitat restoration program in lieu of constructing fish passage facilities into and out of Merwin Reservoir ("In Lieu Program")(PacifiCorp);
- Delaying decisions regarding the appropriateness of constructing fish passage facilities into and out of the Yale Reservoir until 2031 and 2035; and
- Constructing the Yale Downstream, Yale Upstream, and Swift Upstream bull trout passage facilities.

Prior to implementing the proposed action, the Services must make a final determination under Section 4.1.9 of the Settlement Agreement regarding the appropriateness of reintroducing fish passage into Merwin Reservoir and Yale Reservoir. It is the Utilities' understanding that the Services will do so as part of the Projects' license amendment processes. If the Services' final determination affirms their preliminary determination from April 2019, PacifiCorp will be required to: (a) pursue habitat restoration funding in lieu of construction and operation of anadromous fish passage facilities into and out of Merwin Reservoir, and (b) proceed with alternative bull trout passage facilities as required by Section 4.10 of the Settlement Agreement. Similarly, if the Services' final determination affirms their preliminary one, the Services will defer a decision to construct anadromous fish passage facilities into and out of Yale Reservoir. Accordingly, after the Services make a final determination and FERC acts on the requested license amendments to comport with that determination, the Utilities will then execute the requirements of their licenses for the Projects as amended by FERC.

Implementing the Services' final determinations will require project modifications and resource enhancement measures. Detailed information regarding these project modifications and resource enhancement measures are included in the following documents:

- Lewis River Merwin In-Lieu Program Strategic Plan
- Lewis River Basin Implementation Monitoring Plan
- Lewis River Bull Trout Passage Plan

These documents are provided in Volume III of this amendment application.

E.2.0 Consultation and Compliance

PacifiCorp has informed and consulted with a variety of stakeholders (Tribes, agencies, and non-governmental organizations) in identifying, conducting and reporting resource studies, and preparing this application for FERC license amendment. Parties to the Lewis River Settlement Agreement and representatives to the Lewis River Aquatic Coordination Committee were contacted via mail, e-mail, phone call, FERC filings, and/or in-person regarding available information, periodic updates, meeting announcements, and opportunities for written comments. As the Commission's non-federal representative for Endangered Species Act (ESA) Section 7 consultation and National Historic Preservation Act Section 106 consultation, PacifiCorp engaged with the appropriate agencies and tribes during study plan preparation, implementation and reporting. A list of engagements conducted by PacifiCorp starting with notification to the Lewis River Aquatic Coordination Committee of intention to conduct resource studies to inform the Services decisions on fish passage or in lieu habitat funding is provided in the Appendices to Exhibit E of this license amendment application.

The draft application for license amendment was distributed to the following Tribes, resource agencies and nongovernmental organizations for a 90-day comment period on February 5, 2020. Comments were due to PacifiCorp on May 13, 2020.

American Rivers
City of Woodland
Clark County
Confederated Tribes and Bands of the Yakama Nation*
Cowlitz County

Cowlitz Indian Tribe*
Cowlitz-Skamania Fire District No. 7
Fish First
Lewis River Aquatic Coordination Committee Representatives
Lewis River Citizens at-Large
Lewis River Community Council
National Marine Fisheries Service*
National Park Service
North Country Emergency Medical Service
Public Utility District No. 1 of Cowlitz County, Washington
Rocky Mountain Elk Foundation, Inc.
Skamania County
The Lower Columbia Fish Recovery Board
The Native Fish Society
Trout Unlimited
USDA Forest Service*
United States Bureau of Land Management
United States Fish and Wildlife Service*
Washington Department of Ecology*
Washington Department of Fish and Wildlife*
Washington State Recreation and Conservation Office, formerly known as Washington Interagency Committee for Outdoor Recreation
Woodland Chamber of Commerce

* Denotes consultation party for purposes of 18 C.F. R. § 4.38(a)(7).

Comments received in response to the draft application are summarized in the Response to Comments Table provide in Appendices to Exhibit E. Individual comment letters are also included in the Appendix.

A list of the name and address of every federal, state, and interstate resource agency, Indian tribe, or member of the public with which PacifiCorp consulted in preparation of Exhibit E is included in Appendices to Exhibit E of this license amendment application.

E.3.0 General Description of the Locale (18 CFR 4.51(f)(1))

The North Fork Lewis River basin lies on the flanks of the southern Cascade Mountains of Washington State. The river flows in a general southwesterly direction from its source on the slopes of Mount Adams and Mount Saint Helens in the Gifford Pinchot National Forest (GPNF), to the Columbia River downstream of Woodland, Washington. The river is 93 miles long with a total elevation drop of 7,900 feet. The drainage basin is 1,050 square miles with a mean elevation of 2,550 feet mean sea level (msl). Slopes in the upper basin are generally steep, with areas in the lower basin being less steep and characterized by rolling hills and flat woodland bottomlands.

The North Fork Lewis River basin has a complex geologic history, having undergone Tertiary volcanism, several glaciations, and interglacial erosion and deposition. Soils in the basin are predominantly well drained and medium-textured and were derived from volcanic ash or were formed in sediments derived from mixed volcanic rocks and ash. The basin has been subject to major natural landscape altering processes in the recent past. Debris avalanches, mudflows, and lahars are common on Mount St. Helens and Mount Adams and the (Tilling et al. 1990). Streams affected by recent mudflows are continuing to process sediment and woody debris and have changed from narrow channels into wide, braided unable channels with high sediment and wood loads. Riparian vegetation along these channels was lost, but has slowly recovered as sediment loads have decreases with time (PacifiCorp 2005b).

Basin lands provide winter range for deer and elk; mink, beaver and amphibians are common in wetlands and riparian/riverine habitats. Numerous species of birds, including waterfowl, raptors and passerines can be found throughout the watershed. The North Fork Lewis River and its tributaries provide habitat for several salmonid species, including bull trout, cutthroat, and steelhead trout, Chinook, coho and chum salmon, and whitefish.

The climate in the North Fork Lewis River basin is influenced by the Pacific Ocean to the west and the Cascade Range to the east. Average annual precipitation varies from 45 inches near Woodland to over 140 inches on Mount Adams. The majority of the precipitation occurs during the rainy fall and winter months, with snow falling at higher elevations of the basin. Summers (July through mid-October) are generally drier. Snowfall is minimal at lower elevations, but can exceed 200 inches per year at elevations over 3,000 feet. In the warmest summer months, afternoon temperatures range from the middle

The Lewis River watershed is located in an area dominated by natural resources based land uses such as forestry, recreation, and agriculture. As a result, population densities are generally low within the basin. The largest urban center, the City of Woodland, is located near the mouth of the Lewis River, approximately 20 miles north of Vancouver,

Washington. Other towns in the Lewis River basin include Cougar, Ariel, Yale, Chelatchie, Amboy, Yacolt and La Center (Wade 2000). None of these settlements have populations exceeding 2,000 and their economies are primarily dependent upon logging, agriculture, and recreation. There are three private communities located around Swift Reservoir. The largest of these is Northwoods on the eastern shore of the reservoir with 206 homes. Yale Reservoir has private development clustered around the Beaver Bay area, the Town of Cougar and the Speelyai Canal. There is significant private land ownership around Merwin Reservoir.

PacifiCorp owns 15,163 acres of land within the FERC boundaries of the Merwin, Yale and Swift No. 1 projects. Cowlitz PUD owns 664 acres of land within the FERC boundaries of the Swift No. 2 project. The majority of the land is managed for wildlife habitat as mitigation for the construction of and continued operation of the hydroelectric projects. The hydroelectric projects fall in the following order from downstream to upstream: Merwin, Yale, Swift No. 2, and Swift No. 1. Swift No. 2 is owned by Cowlitz PUD and is operated by PacifiCorp as part of the larger Lewis River hydroelectric system. Descriptions of the Lewis River Projects are provided below:

- The Merwin Project is a 136-megawatt power generating facility with a 313-foot high concrete arch dam (Merwin Dam) and a 4,040-acre reservoir (Lake Merwin). The tailrace of the Merwin Dam discharges into the North Fork Lewis River, and the forebay is downstream of the Merwin reservoir.

- The Yale Project is a 134-megawatt power generating facility with a 323-foot high earthen dam (Yale Dam) and a 3,780-acre reservoir (Yale Lake). The tailrace of the Yale Dam discharges into the Merwin reservoir, and the forebay is downstream of Yale reservoir.
- The Swift No. 1 Project is a 240-megawatt power generating facility with a 512-foot earthen dam (Swift Dam) and a 4,600-acre reservoir (Swift reservoir). The discharge from this facility is transported to the 70-megawatt Swift No. 2 power generation facility via the 3-mile Swift Canal and then returned to the Swift bypass reach and/or Yale reservoir. The Swift bypass reach includes a natural channel of the North Fork Lewis River.
- The Swift No. 2 Project is a 73.1-megawatt power generating facility. The Project lies between the Swift No. 1 and the Yale hydroelectric projects on the North Fork Lewis River. The Swift No. 2 Project consists of a power canal, intake structure, penstocks, powerhouse, tailrace discharge channel, substation and transmission line. The canal is 2.8-miles long, with a surface area of approximately 53 acres and a capacity to hold approximately 922 acre-feet of water. The Swift No. 2 powerhouse discharges to Yale reservoir.

The focus of the proposed action discussed in this Exhibit is the locations of proposed habitat restoration efforts (through the implementation of an in-lieu fund) and locations for the proposed bull trout passage facilities. Consistent with the direction provided by the Services, the Utilities would focus on stream reaches upstream of Swift reservoir for habitat restoration that benefits coho salmon (*Oncorhynchus kisutch*), winter steelhead (*O. mykiss*), and spring Chinook salmon (*O. tshawytscha*). The bull trout passage facilities would be located immediately upstream and downstream of the Yale Dam and downstream of the Swift No. 1 Project. No aspects of the proposed action will occur or be constructed within the FERC boundary of Swift No. 2.

E.4.0 Environmental Analysis

E.4.0.1 Water Use and Quality (18 CFR 4.51 (F)(2))

E.4.0.1.1 Long-term Impacts to Water Use and Quality

Continued operations of the Projects include, but are not limited to, flow changes in the lower Lewis River. The three-reservoir, four-project system is operated to achieve optimum benefits for power production and flood management and to provide for natural resources in the basin, such as fish, wildlife, and recreation. The Projects utilize the water resources within the North Fork Lewis River sub-basin from elevation 50 feet above mean sea level at the Merwin Project tailwater to 1,000 feet above mean sea level at Swift No. 1 normal pool. The total usable storage in the reservoirs is 814,000 acre-feet. The total installed capacity for the Projects is 583 megawatts. Operations of the Projects have not materially changed since 2007 and there are no operational changes associated with the proposed action; therefore, no changes or effects to water quantity are anticipated.

Because the proposed action will have no effects on water quantity, there are no anticipated effects to several of the water quality parameters (with the exception of localized temporary water quality impacts associated with construction as noted below in section 4.1.2) including temperature, dissolved oxygen and total dissolved gas. The conditions and effects originally evaluated in the 2006 FEIS will persist. Similarly, since the proposed action will not alter the current anadromous fish passage program activities (to date, the Utilities have provided partial fish passage at the Projects by transporting adult salmon and steelhead from downstream of Merwin Dam into 82 miles of habitat in the uppermost reservoir upstream of Swift Dam and by transporting juveniles collected from Swift Reservoir to downstream of Merwin Dam), there will be no anticipated changes to chemical contamination and nutrients. The conditions of partial passage will persist. Long-term, water quality may improve as a result of in-lieu habitat restoration projects like culvert and road removals that are currently sources of runoff, erosion, and sedimentation.

Thorough characterizations of water quality were provided in the 2006 FEIS (FERC 2006), the 2018 U.S. Geological Survey (USGS) report - Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River, Washington (USGS 2018), the Lewis River Hydroelectric Projects 2018 Annual Report (PacifiCorp and Cowlitz PUD 2019b), and the various Biological Assessments prepared for the projects and relicensing (PacifiCorp 2005a, 2005b, 2012, 2019), and include data pertaining to water temperature, sediment and turbidity, chemical contamination and nutrients, dissolved oxygen, and total dissolved gas. These reports are summarized below to characterize on-going water quality conditions.

Sediment from lahars and ash fall associated with volcanic activity at Mount St. Helens, Mount Hood, and the Indian Heaven volcanic field have largely contributed to sediment input in the Lewis River. The eruption of Mount St. Helens caused mudflows carrying nearly 18 million cubic yards of water, mud, and debris to sweep down Swift Creek, Pine Creek, and the Muddy River, and it ultimately ended up in the Swift reservoir (Tilling et al. 1990). The sediment has been and continues to be transported through the watershed into the lower Lewis River and Columbia River. Current sediment inputs to streams in the watershed are due to land management practices such as timber harvest, farming, grazing, road building, and urbanization. Natural processes that also contribute to sediment input include volcanic eruptions and forest fires (PacifiCorp 2005b).

High runoff and heavy rain in the Lewis River basin often create high turbidity in the reservoirs and streams. Merwin, Swift, and Yale Dams trap a large majority of those high sediment loads, resulting in lower rates of suspended sediments than would have naturally occurred in the Lewis River downstream of Merwin Dam (PacifiCorp 2005b). According to the USGS (2018), the fine sediment values collected in most streams were low except for Little Creek and Pepper Creek, tributaries to the Swift reservoir, where the fine sediment values exceeded tolerant levels for salmonids (Bryce et al. 2010). The turbidity criterion outlined in WAC 173-201A-200(1)(e), states there can be no more than a 10 percent increase over background when the background is more than 50 nephelometric turbidity units (NTUs) and no more than 5 NTU increase over a background when the background is 50 NTUs or less. According to the Lewis River Hydroelectric Projects Water Quality Management Plan (PacifiCorp 2013), the turbidity levels in the tributaries upstream of Swift Dam during the dry summer months were generally low, with a range of 1 to 2 NTUs, and were comparatively high during the rainy season from November through April. Turbidity levels in the Merwin reservoir during the summer months were similar to the summer NTU range recorded in the upper tributaries (less than 2 NTUs), but the winter and spring month turbidity levels reached a maximum of 4 NTUs (PacifiCorp 2013).

E.4.0.1.2 Short-term (Construction-related) Impacts to Water Use and Quality

The proposed action includes installation of bull trout passage facilities within the reservoirs, and In Lieu habitat restoration activities within tributaries upstream of Swift Reservoir. As a result, the proposed action could result in temporary increases in turbidity, sedimentation, and noise during in-water construction as discussed below. The proposed action will not alter the Projects' consumptive water use. Underwater noise is discussed under Section E.4.1.2.1.

Construction of the various project elements, including instream placement of large woody debris (LWD), floodplain reconnection, and road removal activities, could temporarily introduce fine sediments and turbidity into the streams through erosion and sedimentation. However, sedimentation and turbidity effects will be short-term and limited to areas where construction activities occur within or adjacent to rivers and streams.

The extent of turbidity effects will vary for each activity, depending on the extent of work conducted within the wetted channel, the ability to effectively isolate the work area and prevent sediment from entering the main channel, fish salvage activities, and other Best Management Practices (BMPs) that will be implemented to minimize turbidity and sediment effects to listed fish. For example, work areas around LWD placement sites in the tributaries will likely be isolated and dewatered, and fish will be salvaged prior to construction. Elevated turbidity in the stream may occur when the work area is re-watered and connected to the main channel; however, effects to water quality should be minimal due to the short-term nature and minor amount of elevated turbidity that would be reasonably expected. With actions such as floodplain reconnection or development, turbidity effects may be more substantial. Although work will also likely be conducted in the dry, floodplain reconnection often requires earth-moving activities that can loosen sediment and make it more mobile. When a new floodplain or channel is re-watered and connected with the flow of the main channel, a flush of sediment may occur that results in elevated turbidity. This is expected to be temporary in nature but could carry greater volumes of sediment into the stream channel than other smaller-scale activities.

Minimization measures and BMPs will be implemented to limit and minimize the amount of construction-related turbidity from the project site. Contractors will limit the extent of construction-related turbidity based upon permit requirements and mixing zones will vary in length based on stream flow. Turbidity will be monitored during project activities to minimize impacts. Should construction-related turbidity levels exceed permitted levels above background, construction will halt and the BMPs will be inspected and modified as necessary to achieve compliance.

E.4.1 Fish, Wildlife and Botanical Resources (18 CFR 4.51(f)(3))

E.4.1.1 Fish Resources

The Lewis River provides habitat for several salmonid species, including bull trout (*Salvelinus confluentus*), cutthroat trout (*Oncorhynchus clarkii*), steelhead (*O. mykiss*), Chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), chum salmon (*O. keta*), Pacific eulachon (*Thaleichthys pacificus*), resident rainbow trout (*O. mykiss*), and mountain whitefish (*Prosopium williamsonii*). Other fish, such as northern pikeminnow (*Ptychocheilus oregonensis*), white sturgeon (*Acipenser transmontanus*), threespine stickleback (*Gasterosteus aculeatus*), lamprey (*Lampetra* sp. and/or *Ichthyomyzon* sp.), sculpin (*Cottus* sp.), long-nose dace (*Rhinichthys cataractae*), and large-scale sucker (*Catostomus macrocheilus*) are also common. Several non-native fish species are also present, including brook trout (*Salvelinus fontinalis*), tiger muskellunge (*Esox lucius* x *E. masquinongy*), and largemouth bass (*Micropterus* salmoides) (PacifiCorp 2012).

Endangered Species Act (ESA) listed species under the jurisdiction of NMFS may occur in areas potentially affected by the proposed action, including: the Lower Columbia River Evolutionarily Significant Unit (ESU) Chinook salmon, Lower Columbia River ESU coho salmon, Columbia River ESU chum salmon, Lower Columbia River Distinct Population Segment (DPS) steelhead, and Southern DPS eulachon. Critical habitat for all the species listed above and designated essential fish habitat (EFH) for Pacific Salmon (Chinook and coho salmon, specifically) is also present within potentially affected areas. Due to a lack of suitable habitat within the affected area, the proposed action will have no effect on the Southern DPS of green sturgeon (*Acipenser medirostris*), which was listed as threatened on April 7, 2006 (71 FR 17757). Critical habitat for green sturgeon was designated in October 2009. No critical habitat for green sturgeon is present within the potentially affected areas.

Bull trout, an ESA listed species under the jurisdiction of USFWS, also may occur in areas potentially affected by the proposed action. Designated critical habitat for bull trout occurs within the affected area.

The three Project dams (Merwin, Yale, and Swift) and resulting impacts to the North Fork Lewis River represent a major modification of the river and its ecological processes that form and maintain fish habitat. The loss of riparian habitat, degraded water quality (e.g., elevated water temperatures, elevated levels of nutrients, increased nitrogen and phosphorous loading, and higher levels of turbidity), and loss of habitat complexity and connectivity have impaired habitat within the Project area (NMFS 2015). Studies indicate that coho have limited summer habitat available in all sub-basins except Merwin, which is limited by adequate spawning habitat; steelhead have limited summer or winter rearing habitat in all sub-basins; and Chinook have no spawning habitat in Merwin, limited spawning habitat in Yale, and limited summer rearing habitat in Swift (PacifiCorp 2016, Appendix D). The limiting factors analysis indicated that there was adequate spawning habitat upstream of Swift Dam and the amount or quality of summer and winter rearing habitat were limiting Chinook, coho, and steelhead production.

E.4.1.2 Long-term Impacts to Fish

As part of this application, bull trout fish passage facilities will be constructed at three facilities, including: 1) the Yale Downstream Bull Trout Passage Facility in the forebay of Yale Dam, 2) the Yale Upstream Passage Facility at the upper end of Merwin reservoir near the base of Yale Dam and 3) the Swift Upstream Bull Trout Facility in the upper end of the Swift bypass reach near the base of Swift Dam. These facilities will provide upstream and downstream passage for adult and sub-adult bull trout. The netting, trapping, and transporting of bull trout related to these facilities will result in additional handling of all species of fish intentionally and unintentionally captured by the devices, which could have an adverse effect; however, the design of fish per day at each facility is relatively low at 5 adult and 5 sub-adult bull trout for each facility. While the facilities will be designed for continuous year around operations, it is expected that operations at the Yale downstream facility will occur from March through June, with operations at the two upstream facilities occurring from May through October, during adult bull trout migration and spawning period. Adverse effects to non-targeted species may occur as a result of handling, however best management practices in the handling of fish will minimize negative effects that may occur. Although some adverse effects to bull trout may occur as a result of handling, the beneficial effects of improved passage for bull trout and associated access to suitable habitat, will likely offset any negative effects that may occur.

In addition to bull trout fish passage facilities, and included within this application, is implementation of habitat restoration in lieu of providing anadromous fish passage into the Merwin Reservoir (Merwin In Lieu Program). Habitat enhancement and restoration actions would be funded and prioritized in reaches in the upper basin (above Swift Reservoir) and lower basin (below Merwin Dam) in accordance with the Lewis River Merwin In-Lieu Program Strategic Plan. Expected habitat changes include improvements to instream complexity, soil stabilization, and overwater shading, all of which are expected to result in beneficial effects for listed salmonids greater than expected with anadromous fish passage into Merwin Reservoir. Studies indicate that the habitat enhancement and restoration actions identified for implementation under the Merwin In-Lieu Program have the potential to ameliorate temperature increases and flow changes related to climate change and to increase salmon resilience to the effects of climate change. Program actions will result in positive long-term benefits such as:

- Removal of barriers and improved connectivity with instream, off-channel, and floodplain habitat;
- Development of instream complexity and off-channel habitat;
- Improvements to riparian vegetation corridors and plant species composition; and
- Reduction or elimination of impacts to streams and riparian areas from roads.

Fish reintroductions may create positive or negative consequences as a result of novel or increased interspecific interactions. Native fauna are unlikely to have negative interactions with reintroduced species as they are more likely to have evolved niche separation in resource use (Fausch 1988). Species whose life history cycles may be superimposed, such as coho and bull trout, may experience increase competition that may affect survival and/or carrying capacity. By improving habitat complexity under the Merwin In-Lieu Program, habitat availability is anticipated to increase thereby minimizing increased competition with native, resident fish and improving the carrying capacity (Young 2001, Reeves et al. 2003).

In addition to establishing the Merwin In-Lieu Program, decisions regarding fish passage at the Yale Reservoir will be deferred until 2031 (for the Yale Downstream Facility) and 2035 (for the Swift Upstream Facility) to evaluate the implementation and response of the Merwin In-Lieu Program. As a result of this delay, access will continue to be restricted to the extent provided under current operations, which presents a temporal loss in the ability of anadromous fish to access available habitat within and tributary to Yale Reservoir. However, studies on smolt production potential indicated that summer or winter rearing habitat is limited for steelhead and spawning habitat is limited for Chinook in the Yale basin (PacifiCorp 2016, Appendix D). So although access will continue to be restricted, the quality of habitat in the Yale basin may be a limiting factor for critical life stages of anadromous fish and success may be limited under current habitat conditions.

In May 2020, NMFS requested that the Utilities complete additional EDT modeling to quantify the expected increase in coho, spring Chinook, and steelhead adult abundances if juvenile fish collection efficiencies (FCE) were set at 30, 55, 75, and 95 percentages (Table E-1). The analysis compared effects on abundance associated with implementation of fish passage at Merwin Dam versus implementation of the In-Lieu Program and deferring a decision of fish passage at Yale Reservoir ("Merwin In-Lieu + Yale Delay", the proposed action). The In-Lieu Program funding is quantified at $21 million, which is expected to restore approximately 41 miles (66 km) of stream habitat. The previous EDT analysis by NMFS assumed restoration costs of $875,000/km, which would restore approximately 22.5 km of tributary habitat above Swift Reservoir (NMFS-ICF November 2, 2018 model run; NMFS 2019).

Table E-1. EDT model estimates of adult anadromous salmon production from fish passage at Merwin Dam versus the Proposed Action by FCE value.

Alternative	Fish Collection Efficiency											
	30%	55%	75%	95%	30%	55%	75%	95%	30%	55%	75%	95%
	Spring Chinook				Coho				Steelhead			
Merwin Passage	0	0	0	0	118	245	342	445	16	36	51	65
Merwin In-Lieu + Yale Delay	161	262	342	406	457	841	1,108	1,363	76	119	144	164
Difference	*161*	*262*	*342*	*406*	*339*	*596*	*766*	*918*	*60*	*83*	*93*	*99*

Compared with providing anadromous fish passage into Merwin Reservoir, in lieu habitat restoration above Swift Reservoir would increase coho and spring Chinook production in Swift Reservoir tributaries. Steelhead production would also be increased but to a lesser degree.

An EDT analysis was also completed to compare the baseline of current operations (transport of adult salmon collected at Merwin Dam and released upstream of Swift Dam and transport of juvenile salmon collected at the Swift Floating Surface Collector and transported downstream of Merwin Dam) to three alternative scenarios: Merwin In Lieu + Yale Delay (the proposed action); Merwin In Lieu + Yale Passage; and Merwin In Lieu +Yale In Lieu. The Merwin In Lieu assumes that funding of $21 million (in 2020 dollars) will be used for improving fish habitat upstream of Swift Dam, which should be sufficient to restore approximately 41 miles (66 km) of stream habitat. The Merwin In Lieu + Yale Passage alternative would include transport of anadromous salmonids that is currently provided, implementation of habitat restoration upstream of Swift Dam, and additional passage for adult salmon collected at a downstream floating surface collector near Yale Dam and adult collection and sorting facility near either Swift No. 1 Dam or Swift No. 2 power canal. The Merwin In Lieu + Yale In Lieu would include transport of anadromous fish that is currently provided, implementation of habitat restoration upstream of Swift Dam, and habitat restoration for additional stream reaches downstream of Merwin Dam. The Yale In Lieu assumes that an additional $21 million will be used for habitat restoration ($42 million total under the Merwin In Lieu + Yale In Lieu alternative), which should be more than sufficient to restore the target streams upstream of Swift Dam and additional restoration funding can be allocated for reaches downstream of Merwin Dam. The results of this analysis are provided in Table E-2.

Table E-2. EDT Model Estimates of Spring Chinook, Coho, and Steelhead Adult Abundance for the Baseline, Merwin In Lieu + Yale Delay, Merwin In Lieu + Yale In Lieu, and Merwin In Lieu + Yale Passage Alternatives.

Alternative	Fish Collection Efficiency											
	30%	55%	75%	95%	30%	55%	75%	95%	30%	55%	75%	95%
	Spring Chinook				Coho				Steelhead			
Baseline	710	1,308	1,762	2,190	1,621	3,512	5,108	6,737	484	925	1,244	1,541
Merwin In Lieu + Yale Delay	872	1,570	2,104	2,596	2,078	4,353	6,216	8,100	561	1,044	1,388	1,705
Merwin In Lieu + Yale In Lieu	941	1,709	2,300	2,841	2,571	5,035	7,024	9,040	692	1,273	1,678	2,049
Merwin In Lieu + Yale Passage	804	1,537	2,198	3,020	2,039	4,101	6,103	8,759	440	917	1,328	1,793

Through this analysis, all alternatives (including the baseline) are expected to meet biological recovery objectives of the Lower Columbia Fish Recovery Board's *Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan* (2010) as long as fish collection efficiency is at least 60% (which is lower than the Lewis River Settlement Agreement's required 95%). The results also show a difference in fish production of the Merwin In Lieu + Yale Delay alternative compared to the Merwin In Lieu + Yale Passage (Table E-3) and Merwin In Lieu + Yale In Lieu alternatives (Table E-4), respectively. Negative numbers indicate the possible short-term reduction or deferral in fish production resulting from delaying a decision to implement fish passage at Yale or implement habitat restoration in lieu of passage at Yale, respectively.

Table E-3. Difference in Spring Chinook, Coho, and Steelhead Adult Production from Delaying Fish Passage at Yale Dam.

Fish Collection Efficiency	Spring Chinook	Coho	Steelhead
30%	68	39	121
55%	33	252	127
75%	-94	113	60
95%	-424	-659	-88

Table E-4. Difference in Spring Chinook, Coho, and Steelhead Adult Production from Delaying Implementation of Yale In Lieu Alternative.

Fish Collection Efficiency	Spring Chinook	Coho	Steelhead
30%	-69	-493	-131
55%	-139	-682	-229
75%	-196	-808	-291
95%	-245	-940	-344

Thus, the delay at Yale will result in diminished adult production that otherwise may have been realized in a shorter timeframe.

Life history diversity was calculated for each alternative using the EDT model based on the number of trajectories that successfully completed a life cycle (i.e., produced adults)(Table E-5). Higher scores indicate better habitat quality. At 95% FCE, there is little difference in life history diversity for the alternatives, except for the Merwin In Lieu + Yale In Lieu alternative which has substantially higher scores for coho and steelhead. In this alternative, habitat quality and quantity are improved both upstream of Swift Dam and downstream of Merwin Dam.

Table E-5. EDT forecast of spring Chinook, coho, and steelhead life history diversity for all alternatives at fish collection efficiency rates of 30%, 55%, 75%, and 95%. (Malone 2020b)

Alternative	Fish Collection Efficiency											
	30%	55%	75%	95%	30%	55%	75%	95%	30%	55%	75%	95%
	Spring Chinook				Coho				Steelhead			
Baseline	25%	53%	66%	72%	42%	64%	70%	72%	50%	65%	71%	74%
Merwin In Lieu + Yale Delay	36%	62%	70%	73%	49%	68%	73%	75%	55%	68%	73%	76%
Merwin In Lieu + Yale In Lieu	49%	74%	75%	76%	69%	81%	85%	87%	64%	75%	79%	82%
Merwin In Lieu + Yale Passage	19%	43%	61%	72%	28%	54%	69%	75%	37%	59%	70%	76%

Viable salmonid population (VSP) criteria were considered to assess the expected viability of the populations under the Merwin In Lieu + Yale Delay and Merwin Passage alternatives. VSP criteria include spatial structure, diversity, abundance, and productivity. EDT estimates for the delta values of adult productivity, capacity, and life history diversity of the Merwin In Lieu + Yale Delay and Merwin Passage alternatives are summarized in Table E-6. The delta in productivity values provides a comparison of the estimated number of recruits per spawner at low density compared to baseline; capacity is the maximum number of adult fish that can be supported over baseline; and life history diversity is the percentage of life stage trajectories over space and time that are successful in completing a life cycle (i.e., produce adults) over baseline. Values for all three parameters are higher for in lieu habitat improvements upstream of Swift for all three species and FCE assumptions compared to Merwin Passage. Higher VSP scores for an alternative indicate that the population has a higher probability of maintaining itself over time and thus a lower risk of extinction.

Table E-6. Delta Values of EDT Estimates of Productivity, Capacity, and Life-History Diversity for Fish Passage at Merwin Dam and Merwin In Lieu + Yale Delay. Positive and Negative Values Indicate Better or Worse Performance than the Baseline, Respectively.

FCE	Productivity		Capacity		Life History Diversity	
	Spring Chinook					
	Merwin In Lieu + Yale Delay	Merwin Passage	Merwin In Lieu + Yale Delay	Merwin Passage	Merwin In Lieu + Yale Delay	Merwin Passage
30%	0.3	No Spring Chinook	170	No Spring Chinook	11%	No Spring Chinook
55%	0.6	-	254	-	9%	-
75%	1.0	-	307	-	4%	-
95%	1.5	-	353	-	1%	-
FCE	Coho					
30%	0.6	-0.6	342	261	7%	3%
55%	1.2	-0.7	650	375	4%	-6%
75%	1.6	-0.9	898	467	3%	-7%
95%	1.9	-1.1	1,142	566	3%	-4%
FCE	Steelhead					
30%	1.0	-2.0	57	32	5%	-18%
55%	1.9	-3.2	90	53	3%	-17%
75%	2.5	-4.1	113	68	2%	-12%
95%	3.2	-4.8	132	82	2%	-6%

These EDT results were compared to current production and passage metrics of Overall Downstream Survival (ODS) rate, FCE, smolt collection numbers, and adult release numbers at Swift Dam (Table E-7). Calculating the adult productivity based on current FCE metrics shows that only coho adult production would meet biological objectives set by the Lower Columbia Fish Recovery Board under baseline conditions with no habitat improvements (Table E-8). Spring Chinook and steelhead would need a substantial increase in juveniles collected to meet adult abundance biological objectives.

Table E-7. Measurements of ODS rate (2018), FCE (2019), smolts transported downstream (2019), and adults release upstream of Swift Dam in 2017 and 2018.

Species	Overall Downstream Survival Rate (2018)[a]	Fish Collection Efficiency (2019)	Smolts Collected (2019)	Adults Released 2017	Adults Released 2018
Spring Chinook	24%	64%	7,994	800[b]	668[b]
Coho	39%	51%	89,573	6,813	7,060
Steelhead	45%	27%	2,941	592	1,225

[a] Last complete year of available data.
[b] Jack counts not included.

Table E-8. Forecasted spring Chinook, coho, and steelhead adult production based on number of smolts collected by species at Swift Dam and smolt-to-adult survival rates.

Species	Total # Smolts Collected at Swift Dam (2019)	Smolt-to-Adult Survival Rate[a]			Adult Production[b]			Biological Objective[c]
		Min	Average	Max	Min	Average	Max	
Spring Chinook	7,994	0.10%	0.80%	2%	8	64	160	1,500
Coho	89,573	1%	4%	9%	896	3,583	8,062	500
Steelhead	2,941	1.50%	5%	12%	44	147	353	400

[a] Provided by WDFW for EDT Modeling.

[b] Calculated by multiplying total number of juveniles by smolt-to-adult survival rate.

[c] Values from Lower Columbia Fish Recovery Board 2010 provided for comparison purposes.

Juvenile production was then analyzed to determine if there are sufficient numbers to achieve adult abundance objectives for spring Chinook and steelhead, regardless of FCE and ODS. PacifiCorp estimates the annual total of juveniles entering the Swift Reservoir from the Upper North Fork Lewis River subbasin in accordance with the current Aquatic Monitoring and Evaluation Plan (Objective 7.2) to fulfill obligations under Section 9.2.1 of the Settlement Agreement (PacifiCorp and Cowlitz PUD 2017). The data from 2018 and 2019 were used to estimate adult production by multiplying the total number of juveniles by the smolt-to-adult survival rate (Table E-9). For these years, juvenile production for coho and steelhead were sufficient under most smolt-to-adult survival rate conditions to meet biological recovery objectives, but spring Chinook was not.

Table E-9. Forecasted Spring Chinook, Coho, and Steelhead Adult Production Based on Number of Juveniles Entering Swift Reservoir (2018 and 2019) and Smolt-to-Adult Survival Rates Provided by WDFW.

Year	Species	Total # Juveniles Entering Swift Reservoir[a]	Smolt-to-Adult Survival Rate			Adult Production[b]			Biological Objective[c]
			Min	Average	Max	Min	Average	Max	
2018	Spring Chinook	19,290	0.10%	0.80%	2%	19	154	386	1,500
	Coho	150,266	1%	4%	9%	1,503	6,011	13,524	500
	Steelhead	4,713	1.5%	5%	12%	71	236	566	400
2019	Spring Chinook	44,186	0.10%	0.80%	2%	44	353	884	1,500
	Coho	213,531	1%	4%	9%	2,135	8,541	19,218	500
	Steelhead	16,314	1.5%	5%	12%	245	816	1,958	400

[a] Source: PacifiCorp 2019, 2020*b*

[b] Calculated by multiplying total number of juveniles by smolt-to-adult survival rate.

[c] Lower Columbia Fish Recovery Board 2010

Based on the results presented in Table E-8 and Table E-9, FCE, ODS, and juvenile production at Swift would need to be increased to achieve the adult abundance biological recovery objectives for spring Chinook. FCE and ODS improvements alone are not anticipated to sufficiently improve adult production values, and the stronger limiting factor is juvenile production which is dependent on adequate habitat quality and quantity upstream of the Swift Reservoir.

E.4.1.2.1 Short-term Impacts to Fish

Construction of the various project elements, including bull trout passage facilities, instream placement of LWD, floodplain reconnection, and road removal activities, could temporarily introduce fine sediments and turbidity into the streams in the action area through erosion and sedimentation. However, sedimentation and turbidity effects will be short-term and limited to areas where construction activities occur within or adjacent to rivers and streams in the action area. The extent of turbidity effects will vary for each activity, depending on the extent of work conducted within the wetted channel, the ability to effectively isolate the work area and prevent sediment from entering the main channel, fish salvage activities, and other BMPs that will be implemented to minimize turbidity and sediment effects to fish. Elevated turbidity has been reported to cause physiological stress, reduce growth, and adversely affect survival of ESA-listed fish. While juveniles of many salmonid species thrive in rivers and estuaries with naturally high concentrations of suspended solids, studies have shown that suspended solids concentration (as well as the duration of exposure) can be important factors in assessing risks posed to salmonid populations (Servizi and Martens 1987). However, the effects will be short-term and localized in nature, and they are not expected to elevate turbidity levels high enough to have behavioral effects on ESA-listed species. The In Lieu Program projects' minimization measures and BMPS for in-water work will include adherence to an agency-approved in-water work window and implementation of additional measures to minimize project-related impacts as stipulated in the Terms and Conditions contained in the NMFS 2007 Biological Opinion. The in-water work window, as defined by WDFW, for the North Fork Lewis River and tributaries from Merwin Dam to Lower Falls is July 16 to August 15; upstream of Lower Falls, it is July 15 through February 28.

For each habitat restoration or enhancement project, an In-Water Work Protection Plan, consistent with the Terms and Conditions of the NMFS 2007 Biological Opinion, will be prepared and will be strictly followed during all periods of construction that involve in-water work. For projects on U.S. Forest Service (USFS) land, the minimization measures and BMPs described in the USFS Environmental Assessment addressing the Pacific Northwest Region Aquatic Restoration Project (USFS 2019, Appendices 1 and 2) or stipulated in the USFWS Aquatic Restoration Biological Opinion (ARBO II) (pp. 11-67, USFWS 2013) may also be referenced or applicable and incorporated into the project-specific In-Water Work Protection Plan.

Requirements may include, but would not be limited to:

1. Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
2. Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
3. Follow the seasonal restrictions applied to work conducted within or below the ordinary high water mark (OHWM) and minimize in-water work duration as practicable.

4. Construction equipment will not enter any water body without authorization from WDFW, USFWS, and NMFS. Equipment will be operated as far from the water's edge as possible.

Underwater noise associated with construction will be largely confined to the upper basin and areas in the vicinity of bull trout passage facilities. Underwater noise will be propagated only when water levels are greater than 2 feet due to the amplitude of the sound waves (WSDOT 2019). Water levels are likely to be shallow within tributaries where restoration actions may be implemented, allowing work areas to be isolated and dewatered prior to construction. Water depths greater than 2 feet occur in reservoir habitats and may be exposed to elevated noise levels as a result of the construction of bull trout passage facilities. Underwater noise can affect fish in a range of ways from behavioral, to bodily injury, to lethal effects, depending on the type of noise-generating activities being conducted. For the activities of the proposed action bodily injury and lethal effects by noise-generating activities is not expected. Behavior effects are most likely and would consist of fish fleeing the immediate area. As a result, normal behavior associated with rearing, foraging, or migrating may be affected. Since all in-water work will be conducted during an approved window, the potential for listed fish being in the immediate vicinity of noise-generating activities during project construction is low; however, it is possible that fish will be present. The resulting potential effects are likely to be short-term in nature and will not result in any permanent or long-term effects to listed fish. Activities that could result in mortality (i.e. blasting) will not be employed as part of the proposed action.

Prior to construction, the in-water work areas will be isolated with sheet piles, sand bags, inflatable bags, or other suitable methods, as practicable. However, there may be in-water work areas associated with the bull trout fish passage facilities in the reservoirs that cannot effectively be isolated for fish removal due to site conditions and water depth. If work area isolation or dewatering are employed, any fish present within the in-water work area will be removed prior to dewatering. Biologists will follow the fish exclusion protocols and standards approved by the NMFS (2000) and the USFWS (2012) for safe capture and removal of fish from the isolated work area. Implementation of the approved standardized protocols will minimize the likelihood of injury or mortality during the salvage operations. If pumps are used to temporarily bypass water or to dewater residual pools or cofferdams, pump intakes shall be screened to prevent aquatic life from entering the intake.

The proposed project results in a delay of anadromous fish passage into Yale reservoir and associated tributaries or a delay in habitat improvement projects within the Lewis River Basin, beyond what was previously considered in earlier assessments. A deferred decision will mean that physical effects from construction impacts and biological effects from fish passage will not occur in the near-term until a decision is made and implemented after 2031. This deferred decision may benefit bull trout because superimposition of salmon redds upon bull trout redds in Cougar Creek, the single bull trout spawning tributary to Yale reservoir not currently accessible to salmon and steelhead, would be avoided for an additional 10 years.

E.4.1.2.2 Long-term Impacts to Fish Habitat

Habitat enhancement, restoration and fish passage actions that involve in-reservoir work, in-stream work, including installation of passage facilities, LWD placement and floodplain reconnection, will directly affect fish habitat. The placement of LWD in stream channels and the reconnection or creation of side channels or off-channel habitat will permanently alter existing stream habitat and will result in temporarily elevated turbidity levels during construction. However, these habitat enhancement activities will also result in long-term beneficial effects in the form of improved habitat complexity (e.g., pool development and increased off-channel habitat) to better support adult fish by providing more resting and spawning areas and to support juvenile fish with enhanced cover habitat and rearing areas.

The limiting factors analysis indicated that there was adequate spawning habitat upstream of Swift Dam and that the amount or quality of summer and winter rearing habitat were limiting Chinook, coho, and steelhead production. Based upon the research, modeling, and planning efforts to date, four targeted habitat enhancement and restoration categories have been identified across multiple reaches and locations, which are:

- Floodplain restoration to create off-channel habitat and reconnect side channels
- Large wood placement to increase pools, habitat complexity, and fish cover
- Riparian planting to increase shade and delivery of organic material (leaf litter, wood)
- Road removal or restoration to reduce instream sediment (including culvert removal)

These four habitat enhancement categories focus on improving and increasing quality of juvenile rearing habitat, although they will also improve spawning habitat. The anticipated long-term beneficial effects from these actions may include (USFS 2018):

- Restoration of access to historic habitats through removal of impassable barriers;
- Creation of more complex habitats through the addition of wood and boulder structures to streams and floodplains;
- Increased stream length, floodplain connectivity, and riparian vegetation corridors through channel reconstruction and reconnection of side channels;
- Reduction or elimination of impacts to streams and riparian areas from roads; and
- Restoration of riparian plant species composition.

Because there is uncertainty that the proposed habitat actions will increase salmonid production to levels assumed by NMFS, NMFS requires that a Before/After Control/Impact (BACI) or similar statistical monitoring program be designed and implemented to demonstrate results from habitat enhancement and restoration. The Lewis River Basin Implementation Monitoring Plan aims to determine whether the in-lieu projects have met both physical (design) and biological objectives at the project level and reach scale. Specific actions that will be monitored include large wood placement, floodplain restoration, road removal, riparian planting, and population-level biological monitoring. The In Lieu Monitoring Plan recommends monitoring physical responses of large wood placement and floodplain restoration using a BACI design, monitoring riparian plantings and road removals using a before-after (BA) design, monitoring reach-scale juvenile abundance to large wood placement and floodplain projects using an extensive post-treatment (EPT) design, and population level monitoring using a BA design.

Given that most of the proposed habitat enhancement measures include placement of wood or floodplain reconnection, the physical response should be within the first bankfull or higher flow event, which typically occurs within a few years. Studies on large wood placement show a physical response and localized increases in juvenile salmonids within a few years. Thus, the Utilities believe that physical and biological responses from most enhancement measures should be detected within the timeframe of the monitoring plan and allow for adaptive management of later projects implemented as part of the In Lieu Habitat Restoration Plan and program.

E.4.1.2.3 Short-term Impacts to Fish Habitat

Installation of the work area isolation structures associated with instream work will dewater and temporarily displace streambed habitat at the stream restoration and fish passage improvement locations. Although the effect will be temporary in nature, an impact to prey species (invertebrates) is likely to occur. Instream isolation could result in an immediate and direct loss of benthic productivity within the dewatered construction zone; however, macroinvertebrates will likely recolonize the area through downstream drift and aerial recolonization following the completion of the in-water work.

Road removal will result in temporary effects to habitat due to elevated turbidity during construction. The duration and extent of the impacts will depend upon the proximity of the roadway to the stream channel and will be minimized through the implementation of BMPs. Although temporary turbidity impacts will occur, road removal will result in long-term reductions of runoff and sediment inputs to streams, which will improve habitat conditions over the long term. Areas where roads are removed will be replanted with native vegetation to further stabilize soils. Riparian planting activities will be conducted in conjunction with other habitat enhancement activities or as stand-alone actions. While some soil disturbance and non-native invasive species removal will occur within riparian areas, impacts to in-stream habitat are expected to be temporary in nature and minimal. Affected areas will be replanted with native vegetation, which will result in long-term beneficial effects to fish habitat by providing shade and delivery of organic material, including LWD, to the streams.

E.4.1.3 Wildlife and Botanical Resources

The Lewis River Hydroelectric Projects straddle the boundary between the Puget Trough and the Southern Washington Cascades physiographic provinces. The Puget Trough area consists primarily of rolling hills and terraces. Ridges separated by steep, dissecting valleys characterize the Southern Washington Cascades (Franklin and Dyrness, 1988). Area vegetation is supported by a temperate maritime climate. With elevations ranging from about 200 feet near Eagle Island to over 1,000 feet upstream of Swift Creek reservoir, the projects are entirely within the western hemlock vegetation zone, which is characterized by coniferous forest dominated by Douglas-fir, western hemlock, and western red cedar.

Land use practices significantly influence vegetation associated with the Lewis River Projects. Lands around Swift reservoir are relatively unaffected by development and include a patchwork of managed timberlands consisting of various age classes of coniferous forest typical of the western hemlock vegetation zone. Around Yale and Merwin reservoirs, pastures, farmlands, and small residential and recreational developments are interspersed with large areas of managed timberlands and deciduous forest stands. Along the lower river downstream of Merwin Dam, the effects of development are most pronounced; the area is dominated by a riparian deciduous and mixed deciduous-coniferous forest surrounded by residential and recreation developments and agricultural lands. Washington Department of Fish and Wildlife (WDFW) has designated a number of cover types in the vicinity of the Lewis River Projects as priority habitats, including: caves, freshwater wetlands, fresh deepwater, streams, old-growth and mature forest stands, Oregon white oak woodlands, riparian areas, rural open space, areas with abundant snags and logs, and talus (WDFW 2008). Surveys for rare plants in the vicinity of the projects were conducted in 1997, 2000, and 2001, and located only one rare taxa: the green-fruited sedge (*Carex interrupta*).

The Lewis River supports a variety of terrestrial species, including 16 amphibians, 4 reptiles, 103 birds, and 13 mammals (PacifiCorp 2006). Elk (*Cervus elaphus*) and black-tailed deer (*Odocoileus hemionus hemionus*) frequent the Lewis River valley. In addition, the Townsend's chipmunk (*Eutamias merriami*) and Douglas' squirrel (*Tamiasciurus douglasii*) occur in conifer forests within the basin. Evidence of beaver (*Castor canadensis*) was noted in wetlands, and mink (*Mustela vison*) occur in wetland and riparian areas. Although not common, the black bear (*Ursus americanus*), bobcat (*Lynx rufus*), river otter (*Lutra canadensis*) and coyote (*Canis latrans*) are also present in the basin.

The USFWS provided an official list of species identified as threatened, endangered, candidate, or proposed on August 14, 2019. According to the list, terrestrial mammals and birds that can be found in the North Fork Lewis River watershed include gray wolf (*Canis lupus*), North American wolverine (*Gulo gulo luscus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), streaked horned lark (*Eremophila alpestris strigata*), and yellow-billed cuckoo (*Coccyzus americanus*). Golden paintbrush (*Castilleja levisecta*) and water howellia (*Howellia aquatilis*) are threatened flowering plants that are on the list, as well as whitebark pine (*Pinus albicaulis*). Due to a lack of suitable habitat within the action area, the proposed project will have no effect on gray wolf, North American wolverine, marbled murrelet, streaked horned lark, yellow-billed cuckoo, golden paintbrush, water howellia, and whitebark pine. No critical habitat for these species is present within the potentially affected areas. Only northern spotted owl is known to occur in the affected area and has designated critical habitat present.

Bald eagles (*Haliaeetus leucocephalus*), although no longer listed under the Endangered Species Act, remain federally protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act and state protected by the Bald Eagle Protection Law of 1984. Bald eagles use the Project vicinity for both wintering and breeding. Wintering eagles begin to arrive in Washington in October, with most adults arriving in November and December and juveniles arriving in January (Buehler 2000). Winter use is likely related to forage availability, particularly fish, along the Lewis River and nearby drainages. Nest activity and productivity varies from year to year. In Washington, surveys by WDFW conducted in 2005 showed that nearly all (97%) surveyed bald eagle nests occurred within 3,000 feet of shoreline (Stinson et al. 2007).

State endangered, state threatened, state sensitive, and state candidate species designated by the WDFW also have the potential to occur within the affected area. These species include Larch Mountain salamander (*Plethodon larselli*), Van Dyke's salamander (*Plethodon vandykei*), Cascade torrent salamander (*Rhyacotriton cascadae*), Oregon spotted frog (*Rana pretiosa*), western toad (*Bufo boreas*), common loon (*Gavia immer*), northern goshawk (*Accipter gentilis*), pileated woodpecker (*Dryocopus pileatus*), Vaux's swift (*Chaetura vauxi*), Townsend's big-eared bat (*Corynorhinus townsendii*), wolverine (*Gulo gulo*), fisher (*Martes pennanti*), and gray wolf (*Canis lupus*).

The Washington Department of Natural Resources (WDNR) maintains a list of plant species of conservation concern through the Washington Natural Heritage Program (WNHP). In Clark, Cowlitz, and Skamania counties, 73 vascular plant species of conservation concern have the potential to occur. In 2012, PacifiCorp identified 12 fungi species, 20 non-vascular plants, and 51 vascular plants considered by the U.S. Forest Service to be sensitive species with the potential to occur within the Lewis River Basin (specifically within Gifford Pinchot National Forest). Several element occurrences for state sensitive plants occur within the affected area: Rainier pseudocyphellaria lichen (*Pseudocyphellaria rainierensis*), jelly lichen (*Collema nigrescens*), and kidney lichen (*Nephroma occultum*) (WDNR 2019).

E.4.1.3.1 Long-term Impacts to Wildlife

Because daily and seasonal reservoir level fluctuations would continue, the ongoing effects on wildlife would remain. Winter drawdowns result in a large barren stretch of land, limiting the access to water by wildlife, especially medium sized mammals such as rabbits and raccoons that require cover for protection from predation.

Habitat enhancement and restoration activities are anticipated to result in long-term benefits for wildlife in the Lewis River basin by improving availability of prey and aquatic habitat resources. No long-term impacts to northern spotted owl are expected to occur from the proposed action.

E.4.1.3.2 Short-term Impacts to Wildlife

Construction activities related to in-lieu restoration actions and development of bull trout passage facilities will require the use of trucks and other equipment. These activities will result in increased levels of noise and human activity in the project area, potentially resulting in auditory or visual disturbance of wildlife during the construction or implementation of these projects.

The construction of bull trout passage facilities will occur within areas that are already developed for existing hydroelectric facilities and existing roads will be used to access the sites. Wildlife in the vicinity of existing facilities or roads will likely not experience significant disturbance related to these activities, as they are likely habituated to the normal range of sounds and anthropogenic activities associated with these facilities and roads.

The USFWS has noted that spotted owl nesting behaviors will be disrupted by visual disturbance related to activities that occur in close proximity to active nest sites during the early portion of the spotted owl nesting season, which is defined as March 1 to July 15 in Washington (USFWS 2013). Early nesting season behavior includes nest site selection, egg laying, incubation, and brooding of nestlings to the point of fledging (Forsman et al. 1984). Although there could be visual disturbance as a result of these activities, it is expected to be very unlikely. The USFWS has determined that if spotted owls select nest sites in close proximity to existing roads, no impacts to northern spotted owl would be anticipated from use of those roadways

Construction activities occurring during the latter half of the spotted owl nesting season from July 16 to September 30 are not expected to disrupt nesting spotted owls (USFWS 2013). During the late nesting season, juvenile spotted owls have fledged and are able to thermoregulate and to fly short distances, and they are no longer completely dependent upon the adults for daily feedings (Forsman et al. 1984). If an adult or juvenile are flushed at this stage of development, it is not likely to reduce the fitness or ability of juveniles to survive (USFWS 2013). Therefore, the biological effects of noise and visual disturbance that occurs during the late nesting season are considered insignificant.

Construction activities required to implement in-lieu restoration activities and develop bull trout passage facilities will require the use of construction equipment that will likely elevate in-air noise. The USFWS (2013) has identified a distance of 0.25 mile for ground-based activities that are likely to affect spotted owls and a distance of 65 yards from an active nest where ground-based activities are likely to disrupt nesting behaviors. LWD placement or other enhancement activities that are currently “to be determined” are planned to occur on Drift Creek and the Muddy River (Figure 2, Section 2.1.2) and will result in noise-elevating activities within 0.25 mile of known spotted owl site centers. Any in-stream work associated with these activities will be conducted during the in-water work window (likely July 16 through August 15), which would occur toward the end of the nesting season and is not expected to affect spotted owls. Construction of bull trout facilities will also result in noise from equipment use; however, these activities will occur within existing facilities and will use existing roadways. Based on information presented in Tempel and Guttiérez (2003), Delaney et al. (1999), and Kerns and Allwardt (1992), the USFWS notes that spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads; therefore, no impacts to northern spotted owl are anticipated from the development of the bull trout passage facilities.

The most sensitive time of year for bald eagles is during the nest-building, egg laying and incubating periods (January – May) when eagles are most susceptible to disturbance and nest abandonment. Construction activities may cause visual and noise disturbances to nesting eagles; however, in-water work will be limited to outside of the nesting season after young have fledged and is not expected to affect bald eagles. Appropriate buffer distances for construction activities will be followed for activities occurring during the breeding season around active bald eagle nests. If buffer distances or time of year restrictions cannot be followed, an eagle permit will be obtained from the USFWS.

In-water work and associated work isolation and dewatering activities will temporarily impact aquatic habitat used by amphibians, aquatic turtles, and other riparian-dependent wildlife. Instream isolation could result in an immediate and direct loss of benthic productivity within the dewatered construction zone. Highly mobile wildlife is anticipated to flee the immediate area of the work zone, which may temporarily affect behaviors like foraging or breeding. In-stream work activities have the potential to directly harm amphibian eggs and larvae as result of the proposed action; however, this impact is not anticipated to affect the long-term health of these populations due to the generally high fecundities of this taxa and localized nature of the work within the overall river basin.

E.4.1.3.3 Long-term Impacts to Vegetation and Wildlife Habitat

Because daily and seasonal reservoir level fluctuations would continue, the ongoing effects on shoreline vegetation would continue. Fluctuations at Project reservoirs have resulted in a minimal vegetated littoral zone, an extremely narrow zone of riparian vegetation, and a low number of hydrophytic plant species.

Habitat enhancement and restoration actions that involve in-reservoir work, in-stream work, including installation of passage facilities, LWD placement and floodplain reconnection, will directly affect aquatic habitat. The placement of LWD in stream channels and the reconnection or creation of side channels or off-channel habitat will permanently alter existing stream habitat and will result in temporarily elevated turbidity levels during construction. However, these restoration activities will also result in long-term beneficial effects in the form of improved habitat complexity (e.g., addition of LWD, boulders, and gravel) for aquatic life, such as amphibians, aquatic turtles, and riparian-dependent mammals.

Fish habitat enhancements would likely increase fish production, which would provide more food for wildlife that feed on fish including black bears, bald eagles, osprey (*Pandion haliaetus*), and common mergansers (*Mergus merganser*). Many species of birds eat salmon eggs, fry, and fingerlings.

E.4.1.3.4 Short-term Impacts to Vegetation and Wildlife Habitat

Construction of proposed in lieu restoration projects adjacent to stream channels, floodplains, or roadways would increase the amount of temporarily disturbed vegetation and disturbed soils in the project vicinity, potentially increasing the amount of erosion or sediment loading into project waters. Fish habitat enhancements would require the loss of some vegetation and riparian habitat and temporary disturbance of wildlife, however overall it would be a benefit to wildlife in the project areas. It is possible that the proposed action may impact individual plants of conservation concern, but the impact is not anticipated to result in loss of viability of plant populations or species.

Construction related to bull trout passage facilities will occur at existing project facilities. Existing infrastructure and roads would be used to access sites for operational and maintenance activities, limiting impacts to vegetation or wildlife habitat. The only disturbance would be related to temporary shoreline access for installing, operating, and maintaining the facilities.

With the development and implementation of erosion control plans, it is anticipated that there would only be minor amounts of erosion during and following construction. The revegetation of disturbed areas following construction would further decrease the amount of loose soils available to erode and enter the reservoirs. Development and adherence to revegetation guidelines and use of species appropriate vegetation would further protect the soil, water quality and upland habitat.

No spotted owl habitat is expected to be removed or altered a result of these activities. By following appropriate time of year restrictions and buffer distances for construction activities, the FERC and the Utilities have determined that the project activities, as proposed, are not anticipated to affect bald eagles.

E.4.2 Historical and Archaeological Resources (18 CFR 4.51(F)(4))

E.4.2.1 Long-term Impacts to Historical and Archaeological Resources

Ongoing operations of the Projects will continue to generate the same effects on historical and archaeological resources that were considered in the 2006 FEIS, including both known and yet-to-be-identified historic properties and archaeological sites. For example, fish runs will continue to be managed by humans rather than natural, which will perpetuate the ongoing cultural impacts evaluated in the 2006 FEIS. Similarly, facility modifications and new construction can alter historic structures, and archaeological sites will be affected by reservoir erosion and ground disturbing construction activities, as evaluated in the 2006 FEIS. The 2006 FEIS evaluated the cultural, archaeological and historical resources throughout the basin and described the planned protections of cultural resources outlined in the Lewis River Historic Properties Management Plan (HPMP) (HRA 2017), new license terms, and consultation requirements associated with the relicensing. These protections apply to and are not altered by the currently proposed action.

E.4.2.2 Short-term Impacts to Historical and Archaeological Resources

Archaeological and historic sites near those areas potentially affected by the proposed activities are vulnerable to damage as a result of construction activities, erosive effects of human and equipment traffic, and the effects of unauthorized artifact collectors. Following the process defined in the HPMP, prior to commencing any ground-disturbing activities, appropriate consultation will be completed with the cultural resource coordinator and any other agencies and government bodies to ensure regulatory compliance, adequate protection of historical and archaeological resources, and to avoid adverse effects on these resources. Construction will also be subject to the terms of the Project's inadvertent discovery plan (IDP), which is included in the HPMP and is designed to guide contractors and PacifiCorp personnel in the event archaeological items area exposed during ground-disturbing activities (HRA 2017:Appendix G). In general, the IDP provides for work stoppage and defines how the find will be investigated in consultation with the FERC, DAHP, and the Tribes (and the State Physical Anthropologist, in the case of human remains). PacifiCorp personnel working on the Lewis River Projects participate in annual cultural resources awareness training and are familiar with the IDP.

E.4.3 Recreational Resources (18 CFR 4.51(F)(5))

Recreational opportunities for fishing, hunting, hiking, wildlife viewing, mountain biking, horse riding, and off-highway vehicle use are largely available across the Lewis River basin. Public lands within the study area include GPNF, Mount St. Helens National Volcanic Monument, lands managed by WDNR, and local county parks. Other recreational opportunities are available on private lands that provide public access such as forest lands owned by Weyerhaeuser, Long View Fiber, and Olympic Resource Management. PacifiCorp provides several areas for public recreation including campgrounds, parks, and day use areas along all three reservoirs.

E.4.3.1 Long-term Impacts to Recreational Resources

The proposed action does not directly involve modifications to recreational facilities or affect recreational opportunities. However, continued operation of the projects will continue to seasonally affect access to the river or reservoirs based on fluctuating water storage levels. These effects primarily occur in Swift Reservoir during the winter drawdown. Opportunities for recreation (e.g., fishing, boating, hiking) will remain available and open to the public.

Long-term, recreational fishing is anticipated to improve due to fish habitat improvements upstream of the Swift Reservoir. This may result in a greater number of anglers using the Lewis River basin for recreational fishing.

E.4.3.2 Short-term Impacts to Recreational Resources

Recreation may be temporarily affected during construction via localized access restriction and noise and visual disturbances. These effects would only be temporary and localized and not pose a significant effect on recreation. Recreation may be indirectly improved under the proposed action by increasing fish and wildlife populations that would provide more opportunities for fishing and wildlife viewing.

Short-term effects to fishing may occur as a result of the proposed action. Localized restrictions to portions of tributaries or reservoirs during construction, increased water turbidity from construction and habitat restoration, and increased air noise due to construction all may affect recreational fishing yields and visitor's enjoyment of recreational activities by disturbing the aquatic environment and the environmental setting. These impacts would be temporary and localized to the immediate area(s) of construction.

Habitat restoration activities primarily involve in-stream work such as LWD placement and side channel and floodplain restoration, but also riparian plantings and road removals. Trails or trail segments immediately adjacent to tributaries proposed for restoration may experience temporary closures due to construction.

Any short-term impacts on recreation that may occur due to construction of bull trout passage facilities or habitat improvements would not diminish the availability for recreation within the Upper North Fork Lewis River.

E.5.0 References (18 CFR 4.51(f)(7))

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Yale Hydroelectric Project
FERC No. P-2071

Before the
United States of America
Federal Energy Regulatory Commission

Application for License Amendment

Volume III of V
Exhibit E – Appendices

A BERKSHIRE HATHAWAY ENERGY COMPANY

July 2020

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Yale Hydroelectric Project
(FERC No. P-2071)

APPLICATION FOR LICENSE AMENDMENT

This application for license amendment for the Yale Hydroelectric Project (FERC No. P-2071) consists of the following volumes:

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EXHIBIT E – APPENDICES

Yale Hydroelectric Project
(FERC No. P-2071)

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LEWIS RIVER MERWIN IN LIEU PROGRAM STRATEGIC PLAN

June 2020

Prepared for:

PacifiCorp

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Prepared by:

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Cramer Fish Sciences — An Employee Owned Consulting Company

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1.0 Introduction

PacifiCorp and the Public Utility District No. 1 of Cowlitz County ("Cowlitz PUD", together with PacifiCorp, the "Utilities") own and operate the four Lewis River Hydroelectric Projects (the "Projects") located on the North Fork of the Lewis River in Cowlitz, Clark, and Skamania Counties, Washington. The Federal Energy Regulatory Commission (FERC) licenses the four Projects separately. The Merwin (Project No.935), Yale (Project No. 2071), and Swift No.1 (Project No. 2111) Projects are owned and operated by PacifiCorp. The Swift No. 2 Project (Project No. 2213) is owned by Cowlitz PUD and operated in coordination with the other Projects by PacifiCorp.

On June 26, 2008, FERC issued new licenses for the Projects. During the relicensing process, the Utilities entered into a comprehensive settlement agreement with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) (collectively, the "Services"), Tribes, and other stakeholders (the "Settlement Agreement"). The Settlement Agreement includes fish passage requirements for each project that were incorporated into the Project licenses as fishway prescriptions under Section 18 of the Federal Power Act. The Settlement Agreement also includes a provision that allows the Utilities to present new information to the Services regarding whether the construction of the fish passage facilities is appropriate. In the event that the Services determine, after review of such new information, that fish passage is inappropriate, PacifiCorp is required to create an "In Lieu Fund" to support habitat restoration and the Utilities are required to construct certain facilities for bull trout passage.

The Utilities provided new information regarding the appropriateness of fish passage at the Projects to the Services on June 24, 2016. The Services responded on April 11 and 12, 2019, providing the Utilities with a preliminary determination under Section 4.1.9 of the Settlement Agreement. Specifically, NMFS proposed and USFWS concurred in the following actions:

1) To forego construction of the Merwin Downstream Facility (Section 4.6 of the Settlement Agreement) and the Yale Upstream Facility (Section 4.7);

2) To require PacifiCorp to establish the In Lieu Fund consistent with the requirements of Section 7.6 of the Settlement Agreement; and

3) To defer a decision whether to construct the Yale Downstream Facility (Section 4.5) and the Swift Upstream Facility (Section 4.8) until 2031 and 2035, respectively, so that performance of in lieu habitat restoration could be considered in that future decision.

The Services directed that restoration efforts supported by the In Lieu Fund (the "In Lieu Program") focus on stream reaches upstream of the Swift Reservoir that benefit three salmon species listed under the Endangered Species Act (ESA): (coho salmon [*Oncorhynchus kisutch*], winter steelhead [*O. mykiss*], and spring Chinook salmon [*O. tshawytscha*]). The Services identified the following reaches known to support all three species since reintroduction efforts began in 2012:

- Clearwater River (8.37 kilometers [km])
- Clear Creek (22.96 km)
- North Fork of the Lewis River (22.69 km)
- Drift Creek (1.52 km)

In addition, the USFWS, in an April 12, 2019 letter, directed the Utilities to proceed immediately with the development of the following fish passage measures for bull trout (*Salvelinus confluentus*) pursuant to Section 4.10 of the Settlement Agreement:

- Yale Downstream Bull Trout Passage Facility
- Swift Upstream Bull Trout Passage Facility
- Yale Upstream Bull Trout Passage Facility

A determination by the USFWS regarding the Merwin Downstream Bull Trout Passage Facility is not due before 2025. Settlement Agreement Section 4.10.1 states "If, pursuant to Section 4.1.9, PacifiCorp does not build the Merwin Downstream Facility described in Section 4.6, then when USFWS determines that bull trout populations have increased sufficiently in Lake Merwin, but not sooner than the 17th anniversary of the Issuance of the New License for the Merwin Project, PacifiCorp shall construct and provide for the operation of a passage facility similar to the Yale Downstream Bull Trout Facility at Merwin Dam (the "Merwin Downstream Bull Trout Facility")." PacifiCorp is obligated per the Settlement Agreement to take action following the USFWS decision.

The Utilities have prepared this Strategic Plan in response to the Services' preliminary decision. This Strategic Plan is consistent with the requirements of Section 7.6.3 of the Lewis River Settlement Agreement. This Strategic Plan also provides the framework and processes for implementation of the Lewis River Merwin In Lieu Program (In Lieu Program), a fish habitat restoration program to be conducted on the mainstem North Fork Lewis River and tributaries upstream of Swift Dam.

With completion of trap and haul fish passage facilities in 2013, fish passage is provided from Merwin Dam to areas upstream of Swift Dam for spring Chinook salmon, coho salmon, and winter steelhead. Approximately 120 km of stream habitat in the upper Lewis River watershed is available to transported salmon and steelhead (Figure 1).

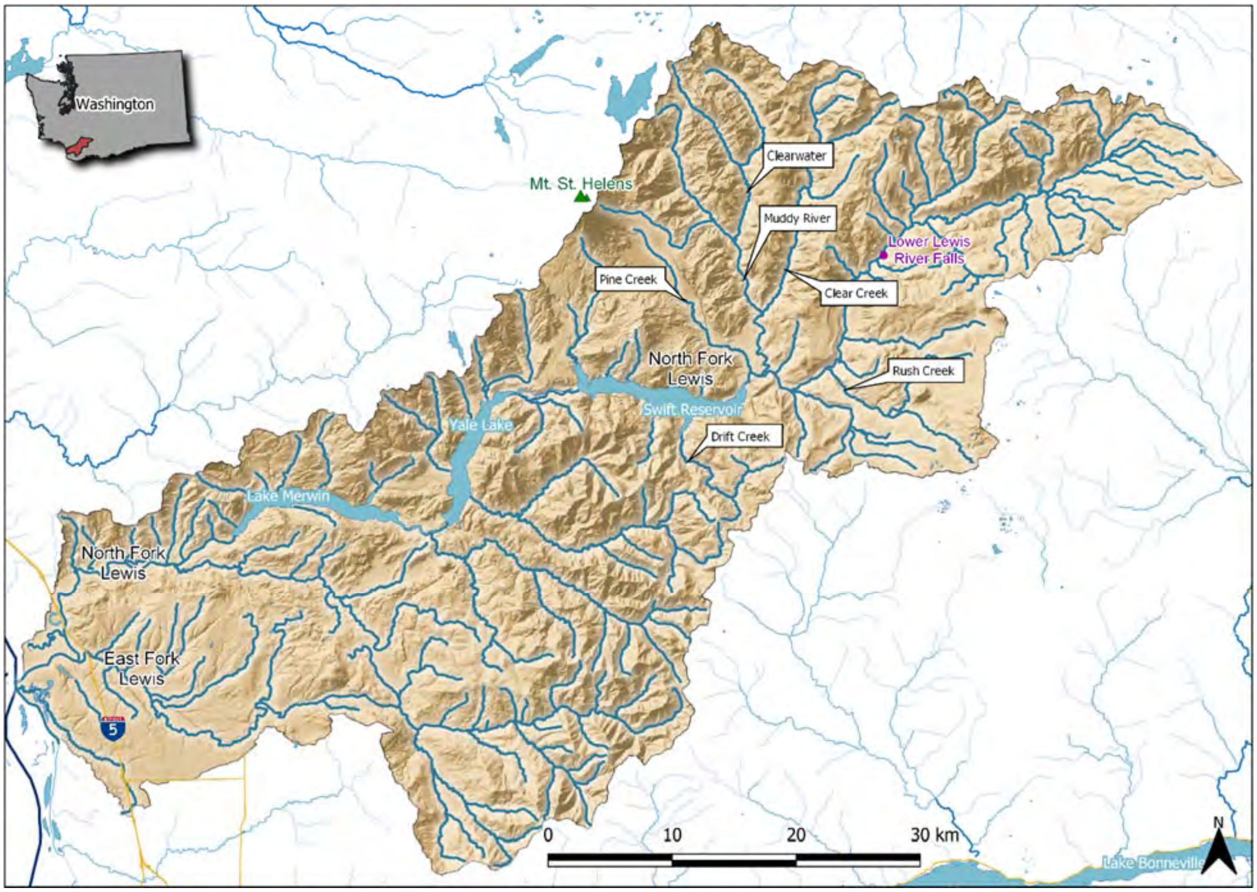

Figure 1. Lewis River Basin and major tributaries to Swift Reservoir.

This Strategic Plan is intended to guide the expenditure of In Lieu Fund monies and the development and implementation of a broad range of aquatic habitat restoration activities in the upper Lewis River watershed, with focus on the sub-basins listed above by the NMFS. This Plan strives to be consistent with and supportive of the Lower Columbia Salmon Recovery Plan (LCFRB 2010) and to dovetail with other regional and local salmon recovery efforts. Previous restoration work in the Lewis River watershed has been completed by the U.S. Forest Service (Forest Service), Lower Columbia Fish Recovery Board (LCFRB), Cowlitz Indian Tribe, Washington Department of Fish and Wildlife, Lower Columbia Fish Enhancement Group and Fish First.

The approach for this Strategic Plan, and ultimately for the yet-to-be prepared Habitat Restoration Plan (HRP), is to use existing information from contemporary studies and analyses, monitoring and evaluation programs, local and technical expertise, and as needed, environmental data from additional fieldwork, to identify specific habitat restoration treatments for individual stream reaches.

1.1 Program Structure

This Plan outlines development and implementation of the In Lieu Program. It reflects a streamlined approach and includes three key components and steps:

1. Completion of the HRP,
2. Preliminary design and permitting,
3. Final design, permitting and project implementation.

This process will help ensure implementation of on-the-ground restoration opportunities and monitoring by 2031. The HRP including design and implementation of habitat projects will be led by PacifiCorp with input at key steps throughout the process from the Aquatic Coordination Committee (ACC) (Figure 2).

This document describes roles and responsibilities of the Utilities and other stakeholders, the progress to date and steps needed to complete an HRP, and the approach for implementing the restoration plan and program. As described in Section 2.0 of this Plan, it is the intent of the Utilities and Services to develop a framework for an HRP that will include reach- and site-specific recommendations for restoration and enhancement measures. The HRP ultimately will provide individual project details sufficient to develop cost estimates from contractors to construct habitat improvement projects.

The implementation section of this Strategic Plan details program administration and oversight, permitting, and the methods to identify and implement aquatic habitat improvement projects. To track the progress of the Merwin In Lieu Program, this Plan also identifies reporting actions at various program milestones.

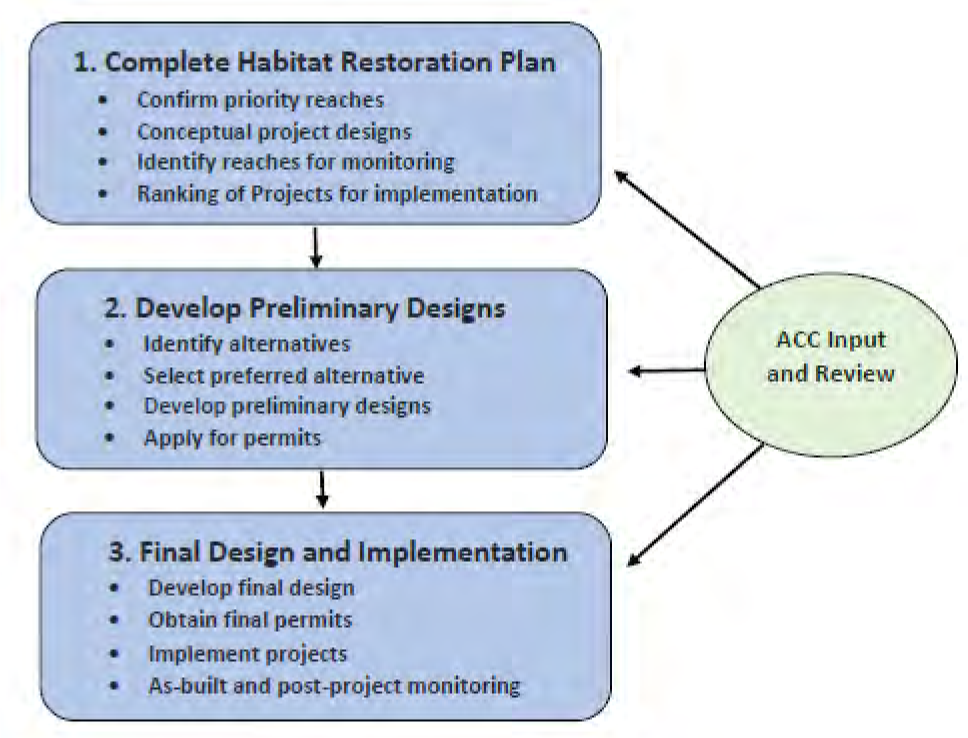

Figure 2. Streamlined process for finalization of Habitat Restoration Plan (HRP) and implementation of In Lieu restoration projects.

1.2 Roles and Responsibilities

1.2.1 Utilities

As owners of the Lewis River Hydroelectric Projects, PacifiCorp and Cowlitz PUD are ultimately responsible and accountable to FERC to ensure that restoration actions comply with project licenses and all applicable legal requirements. Additionally, PacifiCorp is required by Section 7.6.1 of the Settlement Agreement to fund the In Lieu Program in the amounts set forth below (Table 1).

Table 1. Merwin In Lieu Program funding[1].

Name	Date	Funding
Merwin Downstream (11th Anniversary)	June 2019	$3 million
Merwin Downstream (12th Anniversary)	June 2020	$3 million
Merwin Downstream (13th Anniversary)	June 2021	$4 million
Yale Upstream (14th Anniversary)	June 2022	$1.25 million
Yale Upstream (15th Anniversary)	June 2023	$1.25 million
Yale Upstream (16th Anniversary)	June 2024	$1.25 million
Yale Upstream (17th Anniversary)	June 2025	$1.25 million

[1]Note: Payments to begin with issuance of FERC License Order; amounts to include current and unpaid prior years if necessary. Monetary values in the table are in 2004 dollars and will be escalated to current year value as required by Section 7.7.3 of the Lewis River Settlement Agreement.

1.2.2 Program Administrator

PacifiCorp will designate a Program Administrator (PA) whose primary role will be to facilitate and implement the Merwin In Lieu Program. Working in consultation with the Services and the ACC, the PA will oversee and manage development and implementation of the HRP. The HRP will identify restoration/habitat improvement projects or “actions” within previously identified priority reaches (see Section 2). The PA will provide day to day oversight and management of budget and technical elements of the In Lieu Program. Major responsibilities of the PA will include the following:

- Contractor management (scope, budgeting)
- Oversight of construction bid documents
- Liaison to ACC
- Public outreach and response to media inquiries
- Providing quarterly and annual financial and technical reports to the ACC.

The PA will promote individual projects through press releases and other media and community outreach. The PA will develop a Community Outreach plan to identify objectives, target audiences, and methods (i.e., presentations, media releases, website postings, site/project tours, etc.). Additionally, the PA will solicit matching funding to those provided by the Utilities, leveraging these existing funds for habitat improvement grants or other funding elsewhere in the Lewis River watershed (downstream of Merwin Dam and including the East Fork Lewis River watershed) and mainstem Columbia River.

Reports will be provided by the PA to the ACC on a quarterly and annual basis. The PA’s reports will include review of project accomplishments, summary of any monitoring data collected to date (by the PA or others), partnership accomplishments, and financial status of the program. The latter will include business plan tracking, and grant recipient six-month and final reports.

The Utilities will include the PA's annual reports in their annual Aquatic Coordination Committee/Terrestrial Coordination Committee report to FERC.

Utility funded habitat enhancement projects will be conducted upstream of Swift Reservoir (or tributaries draining to Swift Reservoir, e.g., Drift Creek). However, consistent with regional recovery goals, matching funds contributed by others will be unrestricted and available for enhancement projects elsewhere in the Basin, including reaches downstream of Merwin and in the mainstem Columbia River. This availability will encourage coordination and cooperation on large scale projects in the lower mainstem and estuary. Additionally, engagement of the PA into the Merwin In Lieu Program presents a unique opportunity to connect Lewis River habitat projects with lower-river projects, resulting in a more coordinated conservation planning effort with basin wide implications.

1.2.3 Aquatic Coordination Committee

The Lewis River ACC will continue to function in a technical oversight and peer review capacity prior to and during implementation of this Plan and subsequent HRP. The ACC will have various levels of engagement with the PA, including but not limited to:

- Providing a sub-group of habitat experts to review and support completion of a draft HRP;
- Reviewing and approving a final HRP;
- Supporting HRP actions within respective ACC representative's organization.

The ACC will review annual program priorities consistent with the HRP (i.e., the specific habitat work to be completed), and provide recommendations to the PA.

2.0 In Lieu Habitat Restoration Plan

2.1 HRP Background

This section provides goals, objectives, and a framework for the HRP, recognizing that much of the groundwork has been completed through the New Information Report developed by the Utilities over the last several years (PacifiCorp 2016, Al-Chokhachy 2018).

Effective basin-wide restoration plans include several key steps and components to ensure success (Roni and Beechie 2013). These include: 1) setting clear watershed restoration goals, 2) assessing and inventorying watershed conditions, 3) identifying degraded habitat (problems) and potential restoration opportunities, selecting priority sub-watersheds or reaches, 4) selecting appropriate restoration actions and projects within these sub-basins or areas, 5) prioritizing restoration actions, 6) designing restoration and monitoring projects, 7) implementing restoration and monitoring projects, and 8) analysis, reporting and adaptive management (Figure3). In the Lewis River Basin, Ecosystem Diagnosis and Treatment (EDT) model outputs were used during

Step 2 (assess and inventory watershed conditions) to focus the assessment on the highest priority reaches and watersheds draining into those reaches (EDT sheds). Steps 1 through 6 require technical input for final restoration plan development, while Steps 7 and 8 focus on implementation. Considerable progress has been made on identification of restoration opportunities and restoration actions (Steps 2 through 5; PacifiCorp 2016).

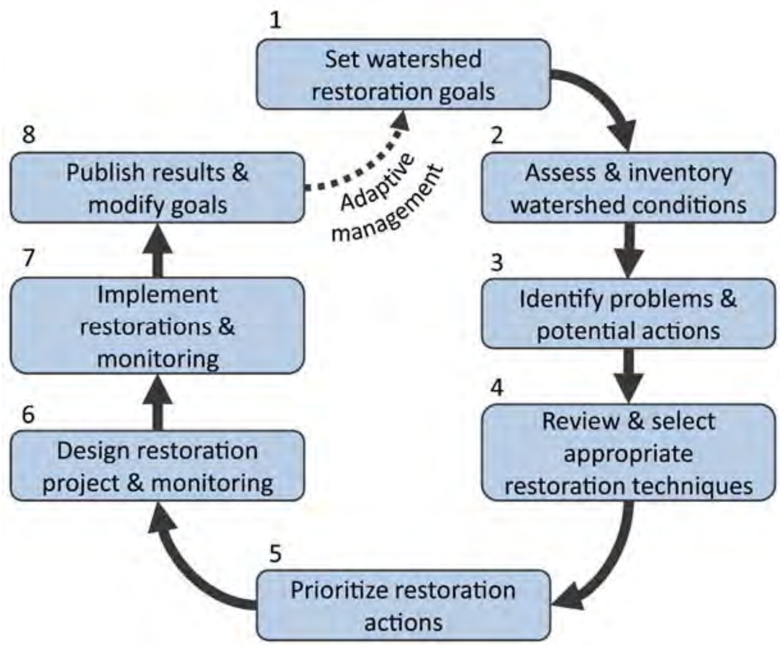

Figure 3. Steps for designing a successful restoration program. ***Source: Roni et al. 2018; Roni and* Beechie *2013.***

As documented in the New Information Report submitted to FERC and the Services in 2016, key assessments of watershed processes, habitat, and fish production have been completed (e.g., EDT analysis, watershed assessment, limiting factors analysis, identification of restoration opportunities in priority EDT reaches) (PacifiCorp 2016). These efforts examined watershed and reach-scale habitat processes, conditions and restoration opportunities throughout the Lewis River Basin where EDT analysis predicted the largest increases in abundance of Chinook, coho, and steelhead. Thus, Steps 1 through 4 in the restoration process (Figure 3) have largely been completed.

As discussed in the Introduction to this Plan, the Services in their April 12, 2019 letter directed that restoration efforts supported by the In Lieu Fund (the "In Lieu Program") focus on stream reaches upstream of Swift Reservoir that benefit three salmon species listed under the ESA: coho salmon, winter steelhead, and spring Chinook salmon. The Services identified the following reaches known to support all three species since reintroduction efforts began in 2012:

- Clearwater River (8.37 km)

- Clear Creek (22.96 km)
- North Fork of the Lewis River (22.69 km)
- Drift Creek (1.52 km)

In addition to the above "NMFS Reaches", EDT model outputs were used to identify the 25 highest priority reaches throughout the basin (16 are upstream of Swift) that would produce the largest increase in spring Chinook, coho, and steelhead. A process-based watershed assessment to identify degraded habitat (e.g., lack of wood or pools, high fine sediment), disrupted watershed processes (e.g., high road density, disconnected floodplain, loss of side channels), and restoration opportunities was then completed for areas flowing into those reaches. This watershed assessment information was coupled with a watershed-scale limiting factors analyses to determine limiting life-stage and habitat for spring Chinook, coho, and steelhead in order to identify initial restoration opportunities. Priority EDT reaches initially identified in PacifiCorp (2016) and those identified by NMFS are shown below (Figure 4).

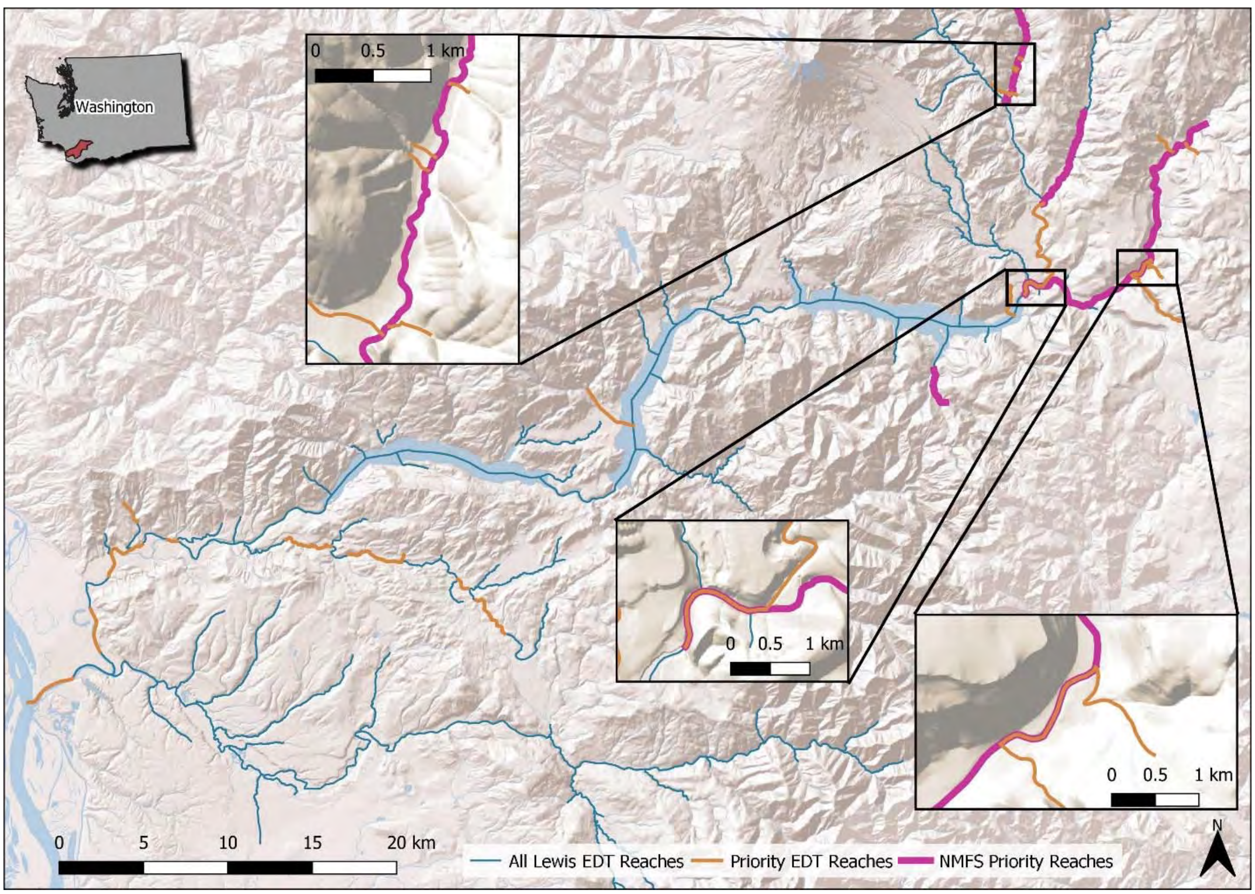

Figure 4. Map of priority EDT reaches initially identified in PacifiCorp (2016) and those identified by the NMFS. The insets show where there is overlap between the two sets of priorities. The watershed around the EDT reaches are the assessment and restoration units associated with each priority reach.

Combining the highest priority EDT reaches from the 2016 watershed assessment with those identified by NMFS provides a strategy that both protects high quality habitat and restores processes and habitat in the highest priority areas (Figure 5). Overarching goals for the In Lieu program will be confirmed among the Services, ACC, Tribes, and other stakeholders early in development of the HRP (Table 2). Given the broader watershed assessment conducted initially, Steps 2 through 4 in Figure will be revisited in consultation with the ACC to fine-tune the process to develop, finalize, and implement the HRP, consistent with the Services' recommendation to focus on streams upstream of Swift Dam. Ultimately, depending on feedback from the ACC, priority reaches may include reaches listed above, and possibly others, since it is likely that restoration monies will not be exhausted on these four reaches given the amount of high quality habitat they contain (see Figure 3 above).

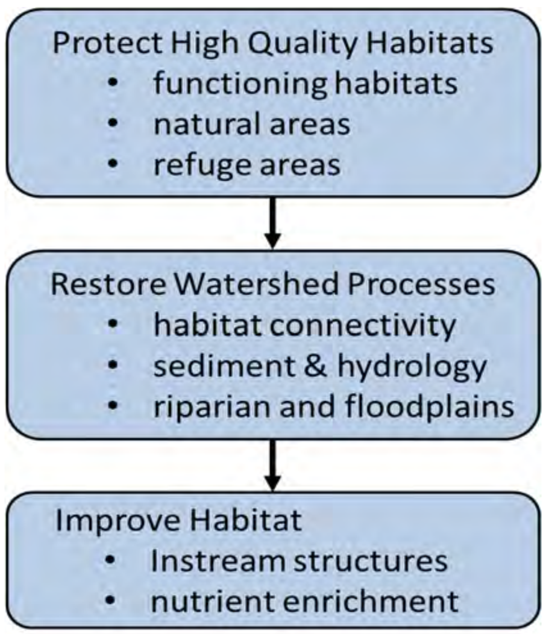

Figure 5. Strategy for prioritizing restoration projects based on protecting the highest quality habitat first and then restoring processes and habitats (based on Roni et al. 2008).

Key steps in the HRP development process were outlined in Figure 3; progress to date on the background studies and key steps in restoration are shown below (**Error! Reference source not found.**). Next steps (including steps 6, 7, and 8 in Figure 3) are discussed in Section 3, Implementation.

Table 2. Status of steps in restoration process outlined in Figure3, and parties responsible in parentheses.

Step in Restoration Process	Status
Confirm restoration goals	Defined in Settlement Agreement and the Services' April 12, 2019 Letters. Support achievement of the Lewis River SA Reintroduction Outcome Goal. Support re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits, and substantial increases in numbers of ESA listed salmon and steelhead (ACC, Utilities).
Assess watershed conditions (processes)	Completed for 25 highest priority EDT reaches in the Lewis River Basin; to be updated for areas upstream of Swift (PA).
Identify problems and restoration opportunities (reaches)	Completed for priority EDT reaches for entire Lewis River Basin; to be updated to include any additional reaches defined by the Services and upstream of Swift (PA).
Review and identify techniques, confirm recommendations	Site visits needed to confirm recommendations from Cramer Fish Sciences (CFS) assessment and proposed preliminary recommendations (see Figure 7) (PA).
Develop concept plans, 30% design/permitting, final design; ACC reviews	To be developed following site visits. ACC will be consulted on key milestones; including development of concept plans (Preliminary Reach Design), 30% design, and final design (PA, ACC, Utilities).
Implement restoration and monitoring	Proposed projects to be bundled by reach and sequenced for construction (PA, ACC, Utilities). Monitoring to be implemented well in advance of restoration (PA).
Report results and adaptively manage restoration program	Annual reports of restoration actions implemented and results of monitoring (PA). Use results to adaptively manage restoration strategy and priorities (ACC, Utilities).

Note: ACC = Aquatic Coordination Committee, PA = Program Administrator.

2.2 Restoration Goals and Objectives

The overall goals of the HRP reflect those of the Lewis River Settlement Agreement Reintroduction Outcome Goal and the Services' April 12, 2019 letter and seek to support re-establishment and improvement in the form and function of aquatic habitats of the Lower Columbia River watersheds[1] that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead and achieve the Lewis River Settlement Agreement Reintroduction Outcome Goal (Settlement Agreement Section 3.1 "… achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations"). In addition, the HRP should focus on process-based habitat restoration strategies to promote long-term salmon and steelhead habitat recovery. Specific objectives include:

[1] Areas under the purview of the Lower Columbia River Fish Recovery Board.

a) Consistency with the Lewis River Settlement Agreement Reintroduction Outcome goal.
b) Consistency with the Lower Columbia Salmon Recovery Plan. Planning, to the extent possible, will be integrated with strategies developed under other regional processes to recover salmon, steelhead, and bull trout listed under the federal ESA.
c) Collaboration and consultation with the Lewis River ACC. Final Plan will seek to have support of ACC and be approved by FERC.
d) Planning based on existing laws, rules, or ordinances created for the purpose of protecting, restoring, or enhancing fish habitat, including the Shoreline Management Act, Chapter 90.58 RCW, the Growth Management Act, Chapter 36.70A RCW, and the Forest Practices Act, Chapter 76.09 RCW.
e) Consideration of habitat projects (within NMFS priority reaches) which have previously been identified and have great expected benefit but have not been implemented ("low hanging fruit").
f) Implementation through approvals of the ACC, facilitated by the PA through a defined process.
g) Acquisition of additional funding for habitat restoration/protection efforts in the Lower Columbia River area.
h) Use of an Adaptive Management cycle to integrate new information as it becomes available.

Several principles will guide implementation of the HRP, including:

- Focus efforts on identifying and prioritizing actions that achieve multiple objectives;
- Consider without prejudice, available actions that benefit aquatic habitat form and function;
- Consider actions that provide resilient habitat over changing conditions;
- Achieve goals and objectives in a cost-effective and efficient manner;
- Strive to ensure that overlap and duplication of efforts is avoided;
- Ensure actions are coordinated and integrated with other planning efforts in the watershed and other activities adjacent to the planning area;
- Facilitate and promote active participation by those entities affected by actions and key decisions;
- Keep affected entities informed of key decisions and outcomes;
- Work cooperatively to achieve the goal and all objectives of the plan;
- Strive to ensure planning actions are integrated into federal, state, and local decision-making processes; and
- Work to broaden public awareness and support of the plan; demonstrate positive outcomes.

Habitat investment is expected to offset the impact of future degradation. Restoration will provide increased resiliency, and help ameliorate impacts of climate change, land management activities, or other factors acting to degrade or undermine watershed processes

2.3 Watershed Assessment

Following the clear definition of goals and objectives, the next step in developing the HRP would be to complete a watershed assessment for key upper Lewis River areas. As noted above and summarized in **Error! Reference source not found.**, the Merwin In Lieu Program will build on the considerable work over the last several years to develop an updated watershed assessment for target reaches. Prior studies include habitat surveys, fish-habitat models, and watershed assessments completed for the Lewis River Basin (Table 3; PacifiCorp 2016). Watershed assessments for Pacific salmon restoration typically include: 1) a synthesis, analyses, and assessment of historic and current conditions, evaluation of lost or inaccessible habitat, assessment of functioning and impaired watershed processes (e.g., riparian, hydrology, sediment); and 2) a fish habitat model (e.g., EDT, limiting factors model, life cycle model) to assist in determining current and potential fish production potential.

As part of the additional information developed in lieu of fish passage (PacifiCorp 2016), available data and information on habitat conditions and watershed processes were assimilated and assessed at a reach (EDT reaches) and sub-basin scale (EDTsheds and Merwin, Yale, and Swift sub-basins). Considerable information has been collected, and a watershed assessment was completed with available information. To help assess conditions in EDT reaches and floodplain and upslope processes, EDT reach breaks were used to define upslope contributing watersheds, landscape conditions, and their spatial connection to streams in the valley bottoms. These "EDTsheds" or sub-watersheds were the unit used to assess watershed and reach-scale processes (Figure 6). Using available data on road density, sediment supply, riparian cover, channel type, and floodplain connectivity and condition, key watershed process impairments in each EDTshed were assessed, including riparian function and condition (seral stage, shade, large wood (LW)), sediment production from roads and mass wasting, and floodplain conditions. This information was then used to identify watershed process and habitat impairments and restoration opportunities (see Section 2.4).

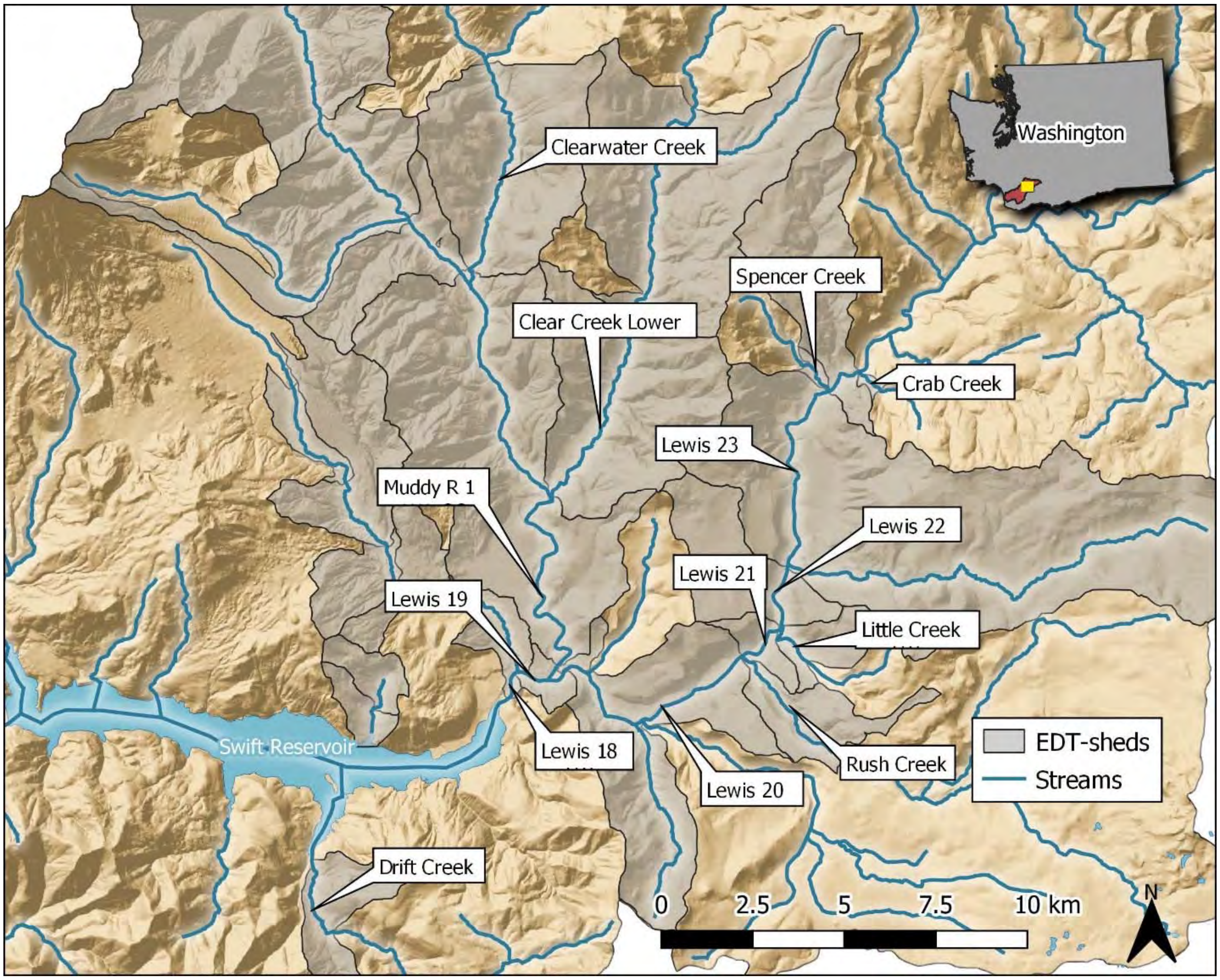

Figure 6. Map of North Fork Lewis River upstream of Swift Dam showing reaches and surrounding drainage area (EDTsheds). Using upstream and downstream EDT reach breaks, EDTsheds encompass areas draining into the reach including upslope, floodplain and riparian areas. The EDTsheds represent units for assessment of watershed and riverine processes and habitat, and units for identification and planning of restoration actions.

As noted previously, an EDT model of reach and sub-basin-specific current and potential salmon and steelhead production potential was also completed (PacifiCorp 2016). The EDT model is a habitat-based model that synthesizes available habitat data and professional opinion to assess current in-channel conditions, and to forecast future conditions. It also provides reach specific ratings of current and potential habitat conditions (e.g., pools, LW, fine sediment) that are used in the watershed assessment. The EDT model is particularly useful for prioritizing reaches for restoration and recovery (McElhaney et al. 2010; Roni et al. 2018). The EDT model also provides a useful tool to assimilate available instream habitat data. For the North Fork Lewis River and its major sub-basins (Lower North Fork, Merwin, Yale, and Swift), in addition to the EDT model, a capacity-based limiting factors assessment was conducted to help determine which habitats were limiting specific life-stages in different sub-basins, and to help identify restoration opportunities (PacifiCorp 2016). Table 3 summarizes the existing data sources and their contribution to the watershed assessment, and what other steps in the restoration process these data sources may assist with answering (Figure). Additional detail on the methods, data sources, and results of the assessment are provided in PacifiCorp (2016).

Table 3. Summary of major information and data sources, coverage, and whether they provide data to help assess habitat conditions, identify limiting life-stage and habitat, identify restoration opportunities, prioritize reaches and restoration actions, or provide background (PacifiCorp 2016).

Description of Data/Info	Geographic Coverage	Assess Instream Habitat	Assess Watershed Process	Limiting Life Stage or Habitat	Rest. I.D.	Prioritiz -ation	Back-ground Info
Fish or Habitat Models							
EDT outputs and source data	Basin	X		X		X	X
Salmon PopCycle Model	Basin						X
Assessments							
Integrated Watershed Assessment	Basin		X				X
Shoreline Master Plan, B.A.s	N.F. Lewis						X
Recovery Planning reports/data	Lower				X	X	X
Watershed Assessment Models	Basin		X		X		
LW assessment	Lower	X					
Channel types	Basin		X		X		X
Monitoring Data							
Habitat and LW	Upper Basin		X		X		X
Parr, smolt, spawner, etc.	Various						X
Other habitat survey data	Various						X

Recognizing that many of the key components of a traditional watershed assessment have been completed (e.g., assessment of processes and habitat, fish-habitat model), additional guidance on priority reaches from the Services requires that three key steps be revisited: 1) confirm priority reaches and sub-basins, 2) summarize watershed assessment data for any additional reaches not covered by the watershed assessment as well as the drainage area upstream of these reaches (PacifiCorp 2016), and 3) review and confirm restoration opportunities and recommended actions (discussed below).

2.4 Identification of Problems and Restoration Opportunities

Information from the watershed assessment, habitat data used for EDT analysis, and information on the processes and habitat restored by different restoration techniques was used to identify potential degraded habitat and initial restoration opportunities (Table 4 below). Sources of information used to identify potential restoration actions in these reaches included:

- EDT outputs for priority reaches;
- Limiting habitat and life stage from limiting factors analysis;
- Watershed assessment data from previous analysis on riparian, sediment, and hydrologic condition;
- Geomorphic channel characteristics and channel type provided by Beechie and Imaki (2014);
- Information on watershed processes and habitats improved by various restoration strategies (Roni et al. 2013a); and
- Information on specific reaches from previous recovery planning efforts (Keefe et al. 2004; LCFRB 2010).

First, data on disrupted processes and degraded habitats, including whether the channel exhibited deviation from the expected channel conditions in the absence of human disturbance were examined. Then, the limiting habitat and life stage for a sub-basin, and any previous information from recovery plans, information on processes in the upstream areas contributing to the EDT sheds, were used to make initial recommendations for restoration in priority reaches. Therefore, identification of problems and restoration opportunities (Step 3 in Figure) has largely been completed for priority EDT reaches and additional reaches identified by NMFS in their April 12, 2019 letter.

2.5 Selection of Restoration Actions and Projects

Following identification of restoration opportunities, the next step in designing the HRP will be to select appropriate restoration actions and projects (Step 4 in Figure). As noted above, restoration opportunities have been identified for the 25 highest priority EDT reaches and priority reaches identified by NMFS (Table 4). This work will need to be completed for any additional reaches identified through finalization of the HRP.

As noted in Table 4 and shown in Figure 7 below, there are four potential types of restoration actions across multiple reaches and locations, including:

1. Floodplain restoration to create and reconnect side channels
2. LW placement to increase pools, habitat complexity, and fish cover
3. Riparian planting to increase shade and delivery of organic material (leaf litter, wood)
4. Road removal or restoration to reduce instream sediment (including culvert removal)

Table 4. Initial recommendations for restoration measures and rationale for selecting specific measures for priority EDT reaches upstream of Swift Dam. Reaches highlighted as a priority for the In Lieu Fund by NMFS are denoted. Lewis 18, 19, and 21 were both priority EDT and NMFS priority reaches. Modified from Appendix D in New Information Report (PacifiCorp 2016). Additional reaches may be considered in the final Strategic Plan.

Reach	Restoration Measure Initially Recommended	Rational for selecting restoration measure
Lewis 18 (NMFS)	LW	Low LW and percent pool
Lewis 19 (NMFS)	LW, side channels	Low LW, percent pool and channel type
Lewis 20 (NMFS)	To be determined	
Lewis 21 (NMFS)	LW, road removal or restoration	Low percent pool, LW, high sediment yield
Lewis 22 (NMFS)	LW	
Lewis 23 (NMFS)	LW	
Drift Creek (NMFS)	LW, road removal or restoration	
Muddy R 1	Side channels, LW	Low LW scores, and island braided channel type
Clear Creek Lower (NMFS)	LW	
Clearwater Creek (NMFS)	LW	
Clearwater Tributaries	NA (high levels of fines appears to be due to headwaters in blast zone of Mt. St. Helens.	Mt. St. Helens blast zone appears to be source of sediment
Rush Creek	Protection (steep channel)	Steep channel
Little Creek	LW	Poor LW and pool area
Spencer Creek	LW	Poor LW and pool area
Crab Creek	LW	Poor LW and pool area

LW placement and floodplain restoration (reconnection or construction of side channels) will be the two most common restoration actions. Large woody material may be available from a number of sources including material recovered from PacifiCorp's reservoirs, Gifford Pinchot National Forest, private timber purchases, etc. As discussed in the In Lieu Program Monitoring Plan (a companion to this Strategic Plan), these are actions for which monitoring will address both biological and implementation effectiveness. Riparian planting will be conducted as part of certain LW or floodplain restoration projects. Road restoration, if necessary, would be limited to a few tributary areas. These four restoration types focus on improving and increasing quality of juvenile salmonid rearing habitat though they will also improve spawning habitat. The limiting factors analysis indicated that there was adequate spawning habitat upstream of Swift Dam, and that the amount or quality of summer and winter rearing habitat were limiting Chinook, coho, and steelhead production. Thus, methods of improving or increasing the amount of spawning habitat, such as gravel addition, are not proposed above Swift Dam.

Restoration measures recommended in Table 4 are planning level recommendations. To confirm that restoration opportunities do exist in these reaches and to identify specific restoration approaches will require more detailed field investigations. First, site visits would be needed to confirm existing habitat, geomorphic, and hydraulic conditions—any potential constraints to restoration. Second, based on these detailed surveys, specific restoration measures would be identified within reaches and preliminary designs and site maps prepared for each reach. This would entail a process similar to that used by the LCFRB for the East Fork of the Lewis and Wind River, and the Colville Tribe for the Sanpoil (Timm et al. 2017), and planned by others (see Appendix 1 for examples from Wind River, and Sanpoil). During site visits to confirm restoration measures and develop conceptual designs, potential treatment and control reaches for the In Lieu Monitoring Plan will also be identified (see discussion in the stand-alone Lewis River Basin Implementation Monitoring Plan).

Field reviews and assessment would produce reach summaries with a list of specific restoration actions, locations, and conceptual designs for each priority reach and key information needed to develop final project design and construction of habitat improvement projects.. Baseline data on reach conditions and processes from the field assessment will also assist with both implementation and effectiveness monitoring.

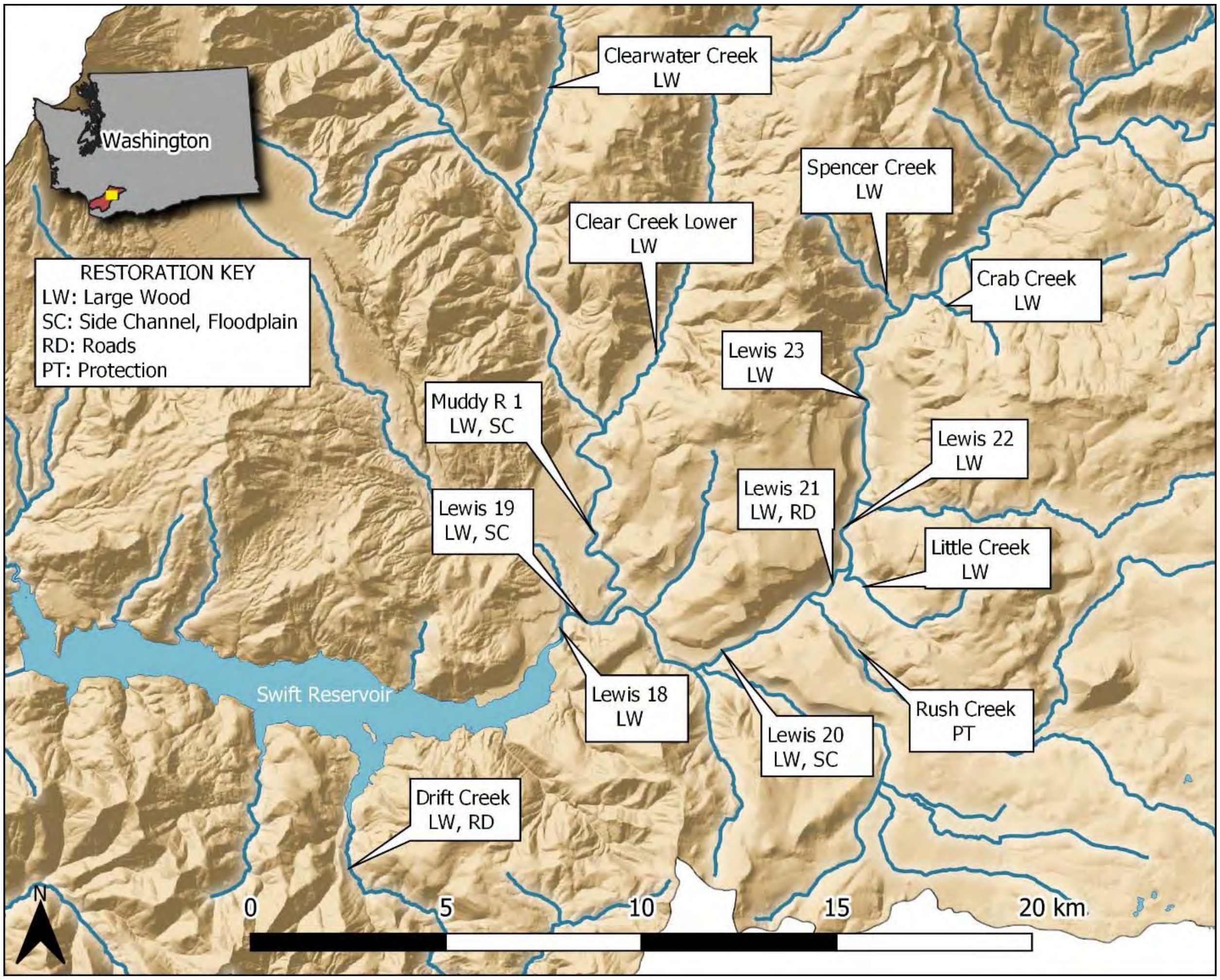

Figure 7. Map of the North Fork of the Lewis River upstream of Swift Dam showing initial priority EDT reaches and recommended restoration measures (PacifiCorp 2016).

2.6 Project Ranking

Prioritization of restoration projects often involves numerical ranking to help select reaches and/or projects within reaches (Beechie et al. 2008; Roni et al. 2013b) (Step 5 in Figure3, Figure 7). However, given prior selection of priority reaches (PacifiCorp 2016), and direction by the Services in their April 12, 2019 letter, ranking of In Lieu projects is only needed to guide implementation, in contrast to determining whether or not a reach is selected. Ranking, or more accurately sequencing may therefore be based solely on access, location, or constructability. However, should new reaches be added, or if funds become limiting, ranking may be required. In this case factors may include the expected increase in juvenile and adult spring Chinook, coho, and winter steelhead abundance (based on existing EDT outputs); support for the three focal species; provision of resilient habitat over changing conditions (restore processes); ecological lift, cost effectiveness; and other technical and non-technical criteria (e.g., access and feasibility). Equally important from an ecological and regulatory standpoint is the potential impact, if any, on federally listed bull trout. For example, projects that could lead to increased superimposition of coho spawning on bull trout redds are not desirable. Maps showing known bull trout spawning areas will be reviewed and recent observations will be discussed with bull trout biologists (e.g., Lewis River Bull Trout Working Group) prior to finalizing project reaches.

The HRP will be designed so that most restoration measures in a reach and associated EDTshed (drainage area) are packaged as one project or action, and ranking, if needed, could be based on predicted adult abundance among priority reaches. In cases whereby certain restoration measures would not be completed due to exhaustion of Merwin In Lieu Fund, the Utilities will seek input from the ACC, review the existing Lewis River Aquatic Fund Priority Reaches developed by the ACC Aquatic Funds Subgroup, and then identify selection for Services confirmation.

3.0 Implementation

3.1 Project Identification

Identification of restoration projects will occur following field visits to confirm opportunities and constraints. Once site visits and Preliminary Reach Design plans are outlined, the Utilities will present these plans to the ACC for review. Following consultation and Services approval, implementation of other Plan actions may proceed.

As noted in Section 2, site visits to priority reaches are to confirm existing habitat, geomorphic, and hydraulic conditions and potential constraints to restoration. These surveys would result in a Preliminary Reach Design for each reach, detailing specific restoration measures/actions, preliminary designs, and site maps. Documentation to be included in the HRP would be similar to that prepared for the LCFRB for the East Fork of the Lewis and Wind River, and the Colville Tribe for the Sanpoil (Timm and Roni 2018) (see Appendix 1 for excerpts from these submittals). As noted above, the Preliminary Reach Design plans (approximately 30 percent design) will be submitted to the ACC for review and comment. Once approved by the Services, the Utilities will prepare permit applications (Section 3.2) and proceed to final design. The ACC, acting as a technical advisor, will be consulted on key milestones during preparation of the HRP; including development of concept plans, 30% design, and final design.

Construction may be conducted utilizing either a Design/Build Process, in which a qualified construction firm works in close collaboration with the design team, or a construction contractor may be contracted separately. The PA and Utilities will develop and submit permit applications, complete final design, and prepare final plans and contract specifications using the concept plans in the Preliminary Reach Design package.

3.2 Permitting/Regulatory Compliance

This Plan assumes the PA will be responsible for securing all project permits. Permits that may be required for projects constructed in Skamania County within or along tributaries to Swift

Reservoir are described below. Available streamlining processes for restoration projects are also described (Section 3.2.1).

Shoreline Permit. Under the State of Washington's Shoreline Management Act (RCW 90.58), Skamania County issues shoreline development permits for activities that occur along rivers, streams, and lakes.

Critical Areas Permit. Per the Washington State Growth Management Act (RCW 36.70A.030(5)), "critical areas" include a) wetlands; b) areas with a critical recharging effect on aquifers used for potable water; c) fish and wildlife habitat conservation areas; d) frequently flooded areas; and e) geologically hazardous areas. Skamania County has adopted a Critical Areas Ordinance to regulate activities in these areas.

Section 404 Permit. A permit under Section 404 of the Clean Water Act is required from the U.S. Army Corps of Engineers (USACE) to conduct any activity that might result in a discharge of dredge or fill material into water or non-isolated wetlands or excavation in water or non-isolated wetlands. Construction activities may be covered by the Corps Regional General Permit #8 for Aquatic Restoration, a streamlined permitting process that avoids the need for an individual permit (see below).

Section 401 Water Quality Certification. Issuance of a Section 404 permit triggers the need for a water quality certification under Section 401 of the Clean Water Act from the Washington State Department of Ecology (Ecology). Certification indicates that Ecology anticipates that the applicant's project will comply with state water quality standards and other aquatic resource protection requirements under Ecology's authority. Section 401 Certification is likely to require presence of a qualified fish biologist if dewatering/fish salvage are necessary.

Aquatic Resources Use Authorization Notification. The Washington State Department of Natural Resources requires a permit for use or occupancy of state-owned aquatic lands.

General Construction Stormwater Permit *(Ecology)*. Covers activities disturbing one or more acres (including grading, stump removal, demolition), and discharge of stormwater to a receiving water (e.g., wetlands, creeks, rivers).

Section 7 Endangered Species Act Consultation *(NMFS/USFWS)*. ESA compliance for potential project impacts to bull trout, Lower Columbia River steelhead, or other listed anadromous fish species may be achieved through individual (project-specific) consultation, or under a programmatic take permit, either for the Merwin In Lieu Program as a whole or under the USACE Regional General Permit #8 (see below). The goal is to have a single consultation on this program, and additional informal consultations if new information arises requiring consideration of affects not considered in the biological opinion(s).

The Merwin In Lieu Program and associated monitoring program will be evaluated during consultation between FERC and the Services. On June 6, 2019, the FERC designated the Utilities as non-federal representatives for the purposes of conducting informal consultation with the Services. The FERC, however, remains ultimately responsible for all findings and determinations regarding the effects of the project on any federally listed species or critical habitat.

Hydraulic Project Approval *(HPA, Washington State Department of Fish and Wildlife [WDFW]).* RCW 77.55 requires that any person, organization, or government agency wishing to conduct any construction activity that will use, divert, obstruct, or change the bed or flow of state waters must do so under the terms of a permit issued by the WDFW.

State Environmental Policy Act (SEPA) Checklist. Under the SEPA, local governments and state agencies use the SEPA checklist to determine whether impacts of a proposed project are likely to be significant, and whether an environmental impact statement (EIS) needs to be prepared for further analysis.

National Environmental Policy Act (NEPA)**.** For projects on the Gifford Pinchot National Forest, the Forest Service will be the lead Federal agency for NEPA. It will be the responsibility of the Contractor to obtain services or dedicate appropriate resources to ensure NEPA compliance is completed as determined by the Forest Service and coordinated with the PA. NEPA compliance for habitat restoration is likely to meet the criteria for a streamlined Categorical Exclusion.

With the exception of the stand-alone SEPA checklist and NEPA documentation, applications for all of the above permits may be submitted through the single Joint Aquatic Resources Permit Application (JARPA).

3.2.1 Streamlined Permits

Streamlined permitting processes are available at both state and federal levels that are designed to reduce both application requirements and agency review time. Currently available streamlining processes are summarized below.

Exemption for Washington State Fish Habitat Improvement Projects. Under RCW 77.55.181, an applicant may qualify for a streamlined permit process with no local government fees if the project is designed to enhance fish habitat. Qualifying applicants are entitled to a streamlined HPA process, exemption from SEPA, and exemption from all local government permits and fees. A completed application package must be sent concurrently to WDFW and applicable local government planning and permitting departments. Local governments have 15 days to provide comments to WDFW regarding whether the project(s) qualifies.

Projects must involve at least one of the objectives below and have a letter of approval from WDFW or other approved state or local agency.

- Fish passage barrier removal (human caused)
- Streambank restoration using bioengineering techniques
- Woody debris placement or other in-stream structures that benefit naturally reproducing fish stocks

Application for the exemption is made through the JARPA process and is submitted to WDFW and the local agency (likely Skamania County).

USACE Regional General Permit 8 – Forest Service Region 6 Aquatic Restoration Program Within the State of Washington. The USACE Regional General Permit (RGP) 8 authorizes 11 restoration activities in waters of the U.S. designed to maintain, enhance, and restore watershed functions that affect aquatic species. It is anticipated that work to be conducted under the Merwin In Lieu Program can be authorized under this RGP, which includes activities below as well as others:

- Fish passage restoration
- Large wood, boulder, and gravel placement
- Channel reconstruction/relocation
- Off- and side-channel habitat
- Streambank restoration

RGP-8 covers actions that occur on Forest Service lands as well as non-Forest Service lands when the action is located immediately adjacent to a National Forest Unit and the project helps to achieve Forest Service aquatic restoration goals. RGP-8 provides coverage under both the ESA and the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The Biological Opinions (BO) prepared by the NMFS dated April 25, 2013, and the USFWS dated July 1, 2013 cover all actions that could be implemented under the Merwin In Lieu Program. Associated mandatory terms and conditions apply to in-water work, work area isolation, equipment operation, and bank/vegetation disturbance. Activities meeting the criteria for RGP-8 are covered by a Section 401 water quality certification issued by Ecology on February 21, 2017.

As described in the RGP, reporting is the responsibility of the Forest Service and involves annual reports as well as a review meeting with the USACE and Ecology to discuss the annual monitoring report, conduct site visits, and collectively determine if RGP objectives are being met. Applicants will need to confirm applicability of RGP-8 with the PA.

3.3 Reporting and Milestones

Contractors selected to construct projects funded under the Merwin In Lieu Program will be required to provide progress reports during construction, including information on dewatering and fish relocation. If federally listed salmon are encountered or taken during construction, the Contractor will notify the PA and provide a report identifying the total number of any salmon captured, relocated, injured, and killed for each restoration project, or group of projects that the Contractor is involved in. Retention of salmon mortalities must be in accordance with agency requirements, until specific instructions are provided by the PA in consultation with the Services.

Any fuel spills during construction, regardless of quantity, will require immediate reporting to both the PA and Merwin Hydro Control Center. Other reporting requirements and associated milestones will be clearly stated in contract bid documents. These will include progress reports submitted with invoices to the PA.

Annual reporting of completed restoration actions and of implementation and effectiveness monitoring will provide critical information for adaptive management of the Merwin In Lieu Program and the HRP.

3.4 Adaptive Management

A number of steps will be used to help adaptively manage the Merwin In Lieu Program. First, pace and cost of restoration should be used to revisit priorities annually. Second, results of restoration implementation monitoring should be used to modify specific project designs to incorporate lessons learned to maximize project physical and biological effectiveness. In addition, these results should help indicate the type of restoration actions that are most effective and can be used to fine tune restoration funding priorities. Third, there are many other ongoing restoration efforts and effectiveness monitoring programs elsewhere in the region (e.g., Sanpoil noted above, Columbia River Basin and Salmon Recovery Funding Board effectiveness monitoring). Results of this monitoring should also be considered adaptively in fine tuning restoration priorities and designs.

Methods and reporting with regard to project effectiveness are described in the Lewis River Basin Implementation Monitoring Plan. Monitoring results will be presented annually to the ACC and, if necessary, remaining restoration projects reprioritized.

Adaptive management will also involve coordination between Utilities and the Forest Service or others to maximize benefits of proposed long-term habitat management commitments, and to ensure ongoing assessment of project and program goals. An understanding of longer-term plans for road closures or other habitat improvement projects will ensure that anticipated benefits of habitat restoration efforts are fully realized.

3.5 Preparers

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Appendices

Appendix 1. Examples of refined restoration measures and restoration plans based on site visits.

A.1 Example from Sanpoil River

Project Name: Upper Columbia and Sanpoil Restoration **Project Rank 22**

Reach Name: Sanpoil 4C

Figure B-54. Overview of Sanpoil 4C reach. This mainstem reach meanders across the valley floor between State Highway 21 on the west side, and East Sanpoil Road on the eastern side of the valley.

Figure B-55. Representative habitat quality of Sanpoil 4C reach. Lots of gravel and LW interactions are apparent as the river meanders across the valley floor.

Location and Site Description: Sanpoil 4C drains approximately 15 km^2 and flows approximately 43 km down to the confluence with the Columbia River. The priority reach is approximately 5,350 m long. It is characterized predominantly by meandering channel morphology (Figure B-54). Bankfull width is approximately 20 m, with a floodplain width of approximately 360 m. Average channel gradient varies with channel type and ranges between approximately 1% and 3%. There is no human infrastructure in the reach aside from the roads that run along both sides of the valley. Habitat quality is generally very high in this reach (Figure B-55). This is in large part due to the massive sediment load being processed in this reach due to the April 2017 flood. Suggestions for restoration in this reach are limited to strategic ELJs that would keep the river away from the State Highway 21 road prism and encourage floodplain habitat engagement on the east side of the river.

Revised Restoration:

Protection, possible ELJs.

Preliminary Restoration Assessment:

LW, riparian restoration, floodplain reconnection, upland forest restoration.

Special Considerations:

There is excellent access and staging at the top of the reach from either side of the river. Large wetlands adjacent to the channel make direct access to the channel less certain elsewhere in the reach. Land ownership has not been verified.

Species and Life Stage Benefit:

Holding habitat for pre-spawn adult fish, spawning, and egg incubation.

Prioritization Criteria Addressed

- Protects fully functioning habitat and restored floodplain processes.
- Access and staging are excellent at the top of the reach, but less certain downstream.
- Land ownership is unknown.
- Relatively high Culturally Significant Resources scores.
- There may be some limited Climate Change Amelioration benefits to this project, depending upon the extent of ELJ placement.

Data Gaps/ Needs:

Specific landowner information and willingness to participate in livestock fencing and riparian plantings needs to be gathered.

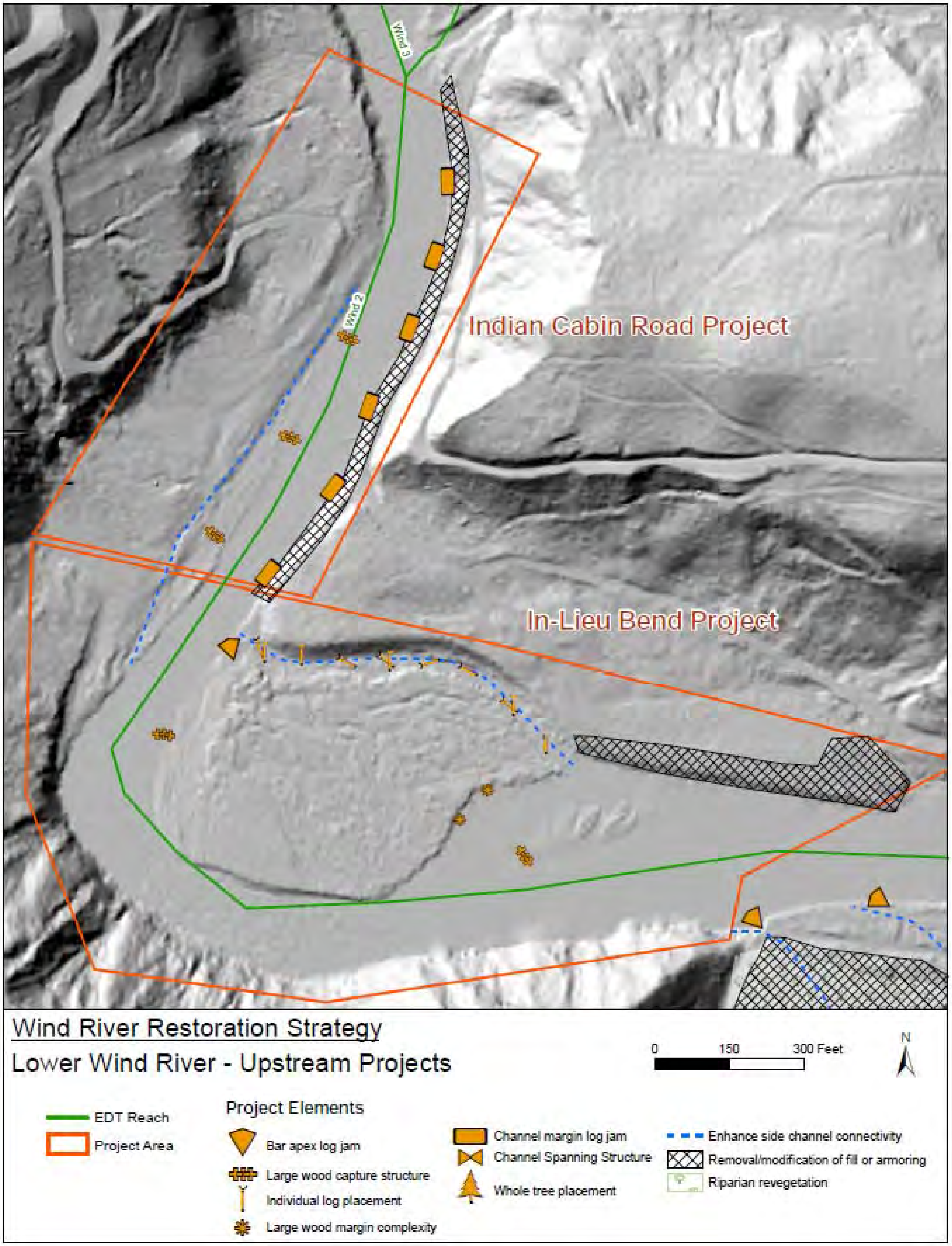
A.2 Example from Wind River Restoration Plan

Project Name: In Lieu Bend **Project ID**: W3

Site Description:
This site is on a bend in the river. The inside of the bend contains side-channel scars and a backwater area at the downstream end. There is a large wood jam at the upstream end of the side-channel scar complex.

Project Description:
Could reposition the wood in the jam, and use select excavation, to increase activation of the side channel. Could also redistribute wood into mainstem jams or into the existing backwater area downstream. Could add wood to mainstem channel margins and to the apex of the mid-channel island downstream. Work with tribes to enhance riparian conditions and margin habitat at the In lieu fishing area.

Special Considerations:
It is important to avoid any main channel work that would increase erosion of the high and erodible right bank. In lieu fishing uses will need to be considered.


Wind 3
Wind 2
Indian Cabin Road Project
In-Lieu Bend Project
Wind River Restoration Strategy
Lower Wind River - Upstream Projects
0
150
300 Feet
N
EDT Reach
Project Area
Project Elements
Bar apex log jam
Large wood capture structure
Individual log placement
Large wood margin complexity
Channel margin log jam
Channel Spanning Structure
Whole tree placement
Enhance side channel connectivity
Removal/modification of fill or armoring
Riparian revegetation

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LEWIS RIVER BASIN IMPLEMENTATION MONITORING PLAN

For Habitat Restoration in Lieu of Fish Passage

June 2020

Prepared for:

PacifiCorp

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1.0 Introduction

PacifiCorp and the Public Utility District No. 1 of Cowlitz County ("Cowlitz PUD", together with PacifiCorp, the "Utilities") own and operate the four Lewis River Hydroelectric Projects (the "Projects") located on the North Fork of the Lewis River in Cowlitz, Clark, and Skamania Counties, Washington. The Federal Energy Regulatory Commission ("FERC") licenses the four Projects separately. The Merwin (Project No.935), Yale (Project No. 2071), and Swift No.1 (Project No. 2111) Projects are owned and operated by PacifiCorp. The Swift No. 2 Project (Project No. 2213) is owned by Cowlitz PUD and operated in coordination with the other Projects by PacifiCorp.

On June 26, 2008, FERC issued new licenses for the Projects. During the relicensing process, the Utilities entered into a comprehensive settlement agreement with the Services, Tribes, and other stakeholders (the "Settlement Agreement"). The Settlement Agreement includes fish passage requirements for each project that were incorporated into the Project licenses as fishway prescriptions under Section 18 of the Federal Power Act. The Settlement Agreement also includes a provision that allows the Utilities to present new information to the Services regarding whether the construction of the fish passage facilities is appropriate. In the event that the Services determine, after review of such new information, that fish passage is inappropriate, PacifiCorp is required to create an "In Lieu Fund" to support habitat restoration and the Utilities are required to construct certain facilities for bull trout passage.

The Utilities provided new information regarding the appropriateness of fish passage at the Projects to the Services on June 24, 2016. The Services responded on April 11 and 12, 2019 providing the Utilities with a preliminary determination under Section 4.1.9 of the Settlement Agreement. Specifically, NMFS proposed and USFWS concurred in the following actions:

1) To forego construction of the Merwin Downstream Facility (Section 4.6 of the Settlement Agreement) and the Yale Upstream Facility (Section 4.7);

2) To require PacifiCorp to establish the In Lieu Fund consistent with the requirements of Section 7.6 of the Settlement Agreement; and

3) To defer a decision whether to construct the Yale Downstream Facility (Section 4.5) and the Swift Upstream Facility (Section 4.8) until 2031 and 2035, respectively, so that performance of in lieu habitat restoration could be considered in that future decision.

The Services directed that restoration efforts supported by the In Lieu Fund (the "In Lieu Program") focus on stream reaches upstream of the Swift reservoir that benefit three salmon species listed under the Endangered Species Act (ESA): (coho salmon *Oncorhynchus kisutch*, winter steelhead *O. mykiss*, and spring Chinook salmon *O. tshawytscha*). The Services identified the following reaches known to support all three species since reintroduction efforts began in 2012:

- Clearwater River (8.37 kilometers [km])
- Clear Creek (22.96 km)
- North Fork of the Lewis River (22.69 km)
- Drift Creek (1.52 km)

In addition, the USFWS, in an April 12, 2019, letter, directed the Utilities to proceed immediately with the development of the following fish passage measures for bull trout *Salvelinus confluentus* pursuant to Section 4.10 of the Settlement Agreement:

- Yale Downstream Bull Trout Passage Facility
- Swift Upstream Bull Trout Passage Facility
- Yale Upstream Bull Trout Passage Facility

A determination by the USFWS regarding the Merwin Downstream Bull Trout Passage Facility is not due before 2025. Settlement Agreement Section 4.10.1 states "If, pursuant to Section 4.1.9, PacifiCorp does not build the Merwin Downstream Facility described in Section 4.6, then when USFWS determines that bull trout populations have increased sufficiently in Lake Merwin, but not sooner than the 17th anniversary of the Issuance of the New License for the Merwin Project, PacifiCorp shall construct and provide for the operation of a passage facility similar to the Yale Downstream Bull Trout Facility at Merwin Dam (the "Merwin Downstream Bull Trout Facility")." PacifiCorp is obligated per the Settlement Agreement to take action following the USFWS decision.

This Monitoring Plan has been developed to evaluate the performance of the Merwin In Lieu Program including those habitat enhancement projects the Merwin In Lieu Program will select and is expected to install over the next 5 to 8 years. This is in addition to other ongoing monitoring being conducted to comply with the Projects' FERC licenses and the Lewis River Settlement Agreement, including monitoring adult returns, smolts, and their survival (PacifiCorp and Cowlitz PUD 2017). The actions of this Monitoring Plan are to be conducted in a timely manner. Monitoring results can be used for three major purposes: 1) adaptive management during the implementation of the Merwin In Lieu Program, 2) determine if the Merwin In Lieu Program has improved habitat conditions enough to produce increases in salmon and steelhead estimated by the EDT model, and 3) to inform the Services decision on Yale Downstream and Swift Upstream

Facilities in 2031 and 2035, respectively. Given the overlap of many objectives of the ongoing Lewis River Monitoring & Evaluation (M&E) program, monitoring of the Merwin In Lieu Program will be closely coordinated with existing monitoring efforts to gain efficiencies, ensure consistency of methods, and minimize costs.

An important component of any large river restoration program is project and reach-scale monitoring of completed restoration actions to determine whether restoration projects 1) were built as originally designed, and 2) produced the desired improvements in physical habitat (form and function). These are commonly referred to as implementation and effectiveness monitoring, respectively. If feasible, validation monitoring—assessing whether the changes in physical habitat are producing desired biological results and objectives (e.g., producing more juvenile or adult fish) — can also be an important third component (MacDonald et al. 1991; Roni 2005). In addition, other types of ongoing monitoring, such as status and trend monitoring (e.g., water quality monitoring, spawner surveys, smolt trapping) can provide supplemental information that can help inform design and findings of effectiveness and validation monitoring (Table 1).

Table 1. Types of monitoring, objectives, and examples targeting fish habitat restoration (adapted from MacDonald et al. 1991; Roni 2005).

Monitoring types (other names)	Objectives	Examples
Baseline	Characterizes existing biota, chemical, or physical conditions for planning or future comparisons	Fish presence, absence, or distribution
Status	Characterizes the condition (spatial variability) of physical or biological attributes across a given area	Abundance of fish at time *x* in a watershed
Trend	Determines changes in biota or conditions over time	Spawner surveys and temporal trends in abundance
Implementation (administrative, compliance)	Determines if project was implemented as planned	Did contractor place number and size of logs as described in plan?
Effectiveness	Determines if actions had desired effects on watershed, physical processes, or habitat	Did pool area increase?
Validation (research, sometimes considered part of effectiveness)	Evaluates whether the hypothesized cause and effect relationships between restoration action and response (physical or biological) were correct	Did change in pool area lead to desired change in fish or biota abundance or productivity?

Evaluating the success of individual river restoration actions such as instream structure placement or livestock exclusion has a long history (e.g., Shetter et al. 1949; Hunt 1976; Cederholm et al. 1997; Roni et al. 2015); whereas basin-wide monitoring has been less frequently attempted (Weber et al 2018; Roni et al 2018). Recent publications reviewing both individual and programmatic evaluations provide guidelines and recommendations for design and implementation to help ensure success of monitoring programs for large scale restoration as intended by the Merwin In Lieu Program (Weber et al. 2018; Roni et al. 2013; Roni et al. 2018). In addition, other publications have outlined the key steps for designing effective implementation and effectiveness monitoring (e.g., Roni et al. 2005, 2013; 2018). These steps include defining goals and objectives, the scale of monitoring and inference, the appropriate design and replication, monitoring parameters and sampling scheme, and implementation and reporting (Figure 1).

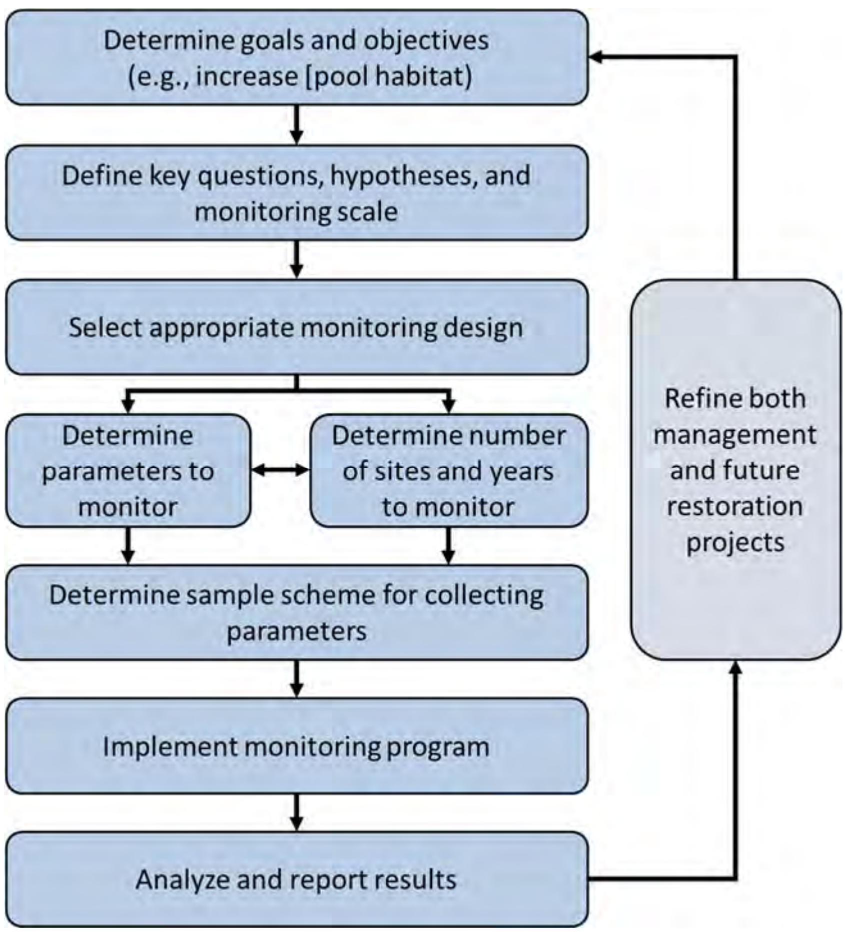

Figure 1. Steps for designing a successful monitoring program to evaluate restoration success (Roni et al. 2015).

This document outlines the monitoring plan for the Merwin In Lieu Program, including detailed information on each step identified in Figure 1. In addition, we describe expected outcomes, and next steps. We focus on implementation and effectiveness monitoring of restoration actions at the project and reach scale[1]. Biological monitoring is also possible for some restoration action types to determine localized changes in reach-scale abundance of juvenile salmonids (parr) related to floodplain restoration (side channel creation or reconnection) and large wood placement—two restoration techniques expected to be widely used in the Merwin In Lieu Program. Therefore, we also describe supplemental biological monitoring that will be conducted to evaluate reach-scale salmon and steelhead parr responses in late summer and winter.

Summer and winter parr rearing habitat are limiting production of all three species above Swift Dam (PacifiCorp 2016), though additional habitat surveys are needed to accurately quantify the total amount of rearing habitat. Determining population level (watershed) responses of spring Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, and winter steelhead *O. mykiss* adults and smolts is equally important, but more challenging given the relatively short timeframe provided to evaluate performance of enhancement actions. However, we also describe approaches for monitoring population level response to the In Lieu Program upstream of Swift Dam and the preferred population level monitoring approach we will implement. Because the exact restoration locations will be determined as part of the final habitat restoration plan (see In Lieu Strategic Plan), we provide a framework for physical and biological monitoring with the understanding that some specifics will need to be modified once final restoration locations and designs have been determined.

1.1 Habitat Restoration Goals and Monitoring Objectives

The goals and objectives of the monitoring program must be based on the overarching goal of the Merwin In Lieu Program, to increase adult Chinook salmon, coho salmon, and winter steelhead abundance in the North Fork of the Lewis River. That goal is consistent with the "Reintroduction Outcome Goal" of the Lewis River Settlement Agreement "… to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations."

In their April 11 and 12, 2019 letters to PacifiCorp and Cowlitz County PUD (together, the Utilities), the Services issued preliminary decisions to defer a decision on completion of Yale downstream and Swift upstream passage facilities to 2031 and 2035, respectively, stating that this decision "would ensure that habitat restoration funding used in lieu of passage facilities in Lake Merwin perform as proposed within the new information submitted…" (NMFS 2019; USFWS 2019). Therefore, an additional goal of this plan is to provide results on restoration effectiveness by 2031 or sooner for consideration by the Services. If one assumes that the earliest restoration might occur is 2022, and that most restoration would not occur until 2025, monitoring should be designed to detect a physical response to restoration within three to five years of restoration project

[1] In this context, a project refers to the localized area where site-specific restoration takes place (typically 500 m to a few kilometers), while a reach typically covers from a few to tens of kilometers.

construction.

Assessments including ecosystem diagnosis and treatment (EDT) and a limiting factors analysis, along with a review of existing habitat, sediment, riparian, and other data, were used to identify initial restoration opportunities within the Lewis River Basin for reaches with the highest potential to increase adult salmon and steelhead abundance (Table 2; Appendix D in PacifiCorp 2016). In addition, in their determination of fish passage feasibility and recommendation to implement the Merwin In Lieu Program, NMFS identified four streams upstream of Swift Dam where restoration should occur (Clear Creek, Clearwater Creek, Drift Creek, and the mainstem North Fork of the Lewis River) (Table 2;Figure 2). Initial restoration opportunities were identified for EDT reaches in these streams using the same approach for priority EDT reaches in PacifiCorp (2016). The next steps are to 1) revisit reaches in Table 2 and NMFS' recommended tributaries to determine priority areas for restoration, and 2) do detailed site visits of each of the reaches to confirm project feasibility and develop conceptual and preliminary designs. Table 2 provides a list of the type of actions that would occur in the priority reaches. Moreover, this list can be used to develop the goals and questions for the monitoring program.

As indicated in the Merwin In Lieu Program Strategic Plan and Table 2 below, there are four major types of restoration actions across multiple reaches and locations including:

1. Floodplain restoration to create and reconnect side channels
2. Large wood (LW) placement to increase pools, habitat complexity, and fish cover
3. Riparian planting to increase shade and delivery of organic material (leaf litter, wood)
4. Road removal or restoration to reduce instream sediment (including culvert removal)

Large wood placement and floodplain restoration (reconnection or construction of side channels) will be the two most common restoration actions. They are also the two actions for which monitoring can address some key biological questions in a reasonable time frame (i.e., less than 10 years). Riparian planting will be conducted as part of some LW or floodplain restoration projects and road restoration likely limited to a few tributary areas. These actions largely focus on improving and increasing quality of juvenile rearing habitat though they will also enhance spawning and rearing habitat quality. They are consistent with the limiting factors analysis which indicated that there was adequate spawning habitat upstream of Swift Dam, and that amount, or quality of summer and winter rearing habitat were limiting Chinook, coho, and steelhead production. Thus, gravel addition or other methods of improving or increasing amount of spawning habitat are not proposed above Swift Dam.

The objectives of this monitoring plan are threefold:

1) to develop an approach to determine whether habitat restoration projects were built as designed and have met their design and physical habitat objectives, both at the project level

and reach scale;

2) to determine reach-scale responses of juvenile salmonids to habitat restoration actions and population-level response of smolts and adults to all habitat improvement actions above Swift Dam; and

3) to determine if habitat restoration has improved habitat conditions enough to produce increases in salmon and steelhead estimated by the EDT model.

Ultimately, the results of the monitoring will be used to adaptively manage the In Lieu Program and inform the decision on Yale Downstream and Swift Upstream Facilities in 2031 and 2035.

Table 2. Initial recommendations for restoration measures and rationale for selecting specific measures for priority EDT reaches upstream of Swift Dam. Reaches highlighted as a priority for the In Lieu Fund by NMFS are denoted. Lewis 18, 19, and 21 were both priority EDT and NMFS priority reaches. Modified from Appendix D in PacifiCorp 2016. Additional reaches may be considered in the final strategic plan.

Reach	Restoration Measure Initially Recommended	Rational for selecting restoration measure
Lewis 18 (NMFS)	LW	Low LW and percent pool
Lewis 19 (NMFS)	LW, side channels	Low LW, percent pool and channel type
Lewis 20 (NMFS)	LW, side channels	Low LW score and pool area, island braided channel type (lower part of reach)
Lewis 21 (NMFS)	LW, road removal or restoration	Low LW, and percent pool, high sediment yield
Lewis 22 (NMFS)	LW	Low LW and pool area
Lewis 23 (NMFS)	LW	Low LW and pool area
Drift Creek (NMFS)	LW, road removal or restoration	LW low in some areas, low pool area, high road densities, plane-bed channel
Muddy R 1	Side channels, LW	Low LW scores, and island braided channel type
Clear Creek Lower (NMFS)	LW	Low LW in some areas, low pool area
Clearwater Creek (NMFS)	LW	Low LW in some areas, low pool area.
Clearwater Tributaries	NA (high levels of fines appears to be due to headwaters in blast zone of Mt. St. Helens.	Mt. St. Helens blast zone appears to be source of sediment
Rush Creek	Protection (steep channel)	Steep channel

Reach	Restoration Measure Initially Recommended	Rational for selecting restoration measure
Little Creek	LW	Low LW and pool area
Spencer Creek	LW	Low LW and pool area
Crab Creek	LW	Low LW and pool area

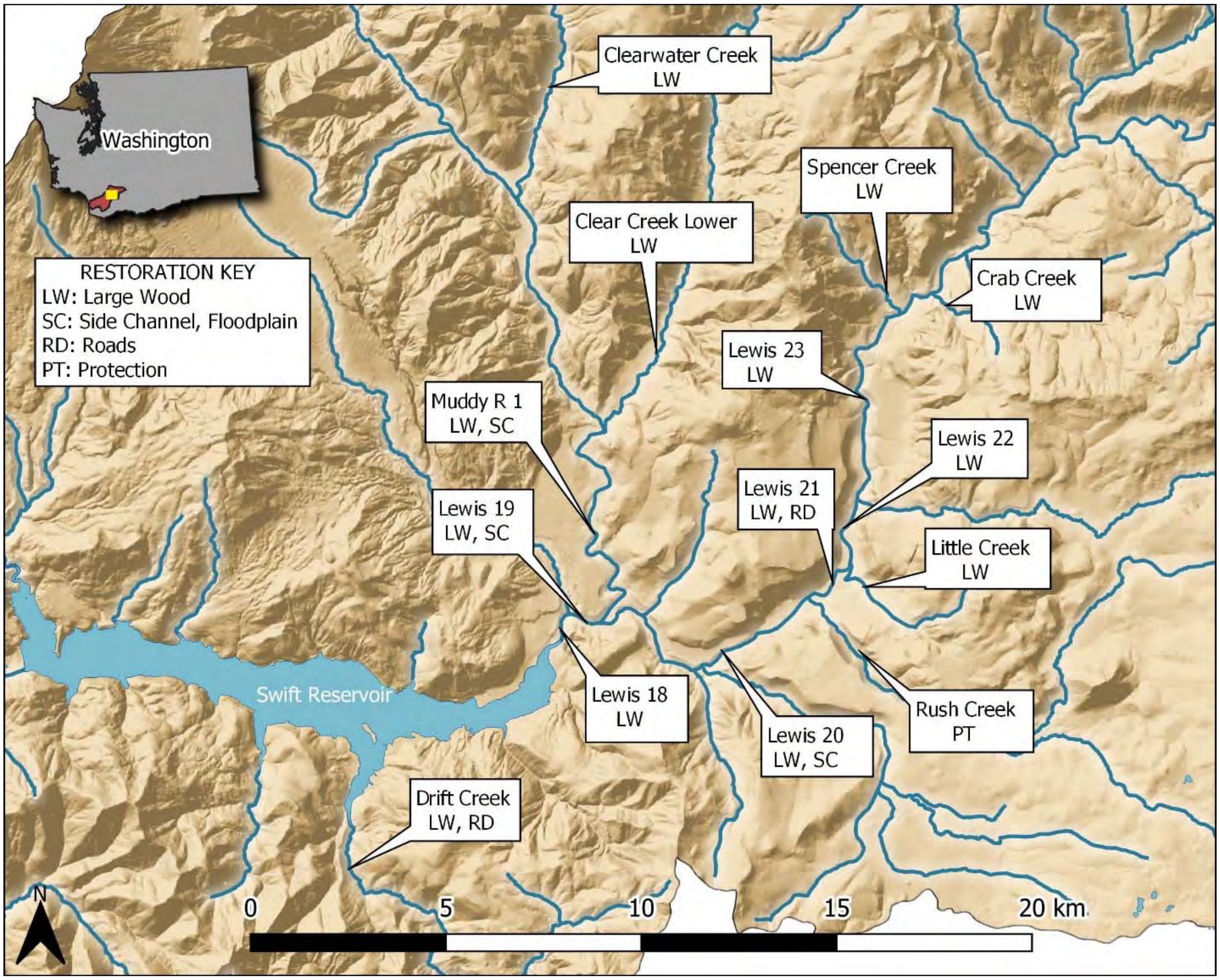

Figure 2. Map of the North Fork of the Lewis River upstream of Swift Dam showing initial priority EDT reaches and recommended restoration measures (PacifiCorp 2016).

1.2 Key Questions and Scale

Based on the initial list of reaches and restoration actions and the goals and objectives of the Merwin In Lieu Program, we defined the following questions to be answered by the monitoring program for each of the restoration actions:

Large wood and floodplain projects

1. Was each project constructed as designed and if not, why? [project-scale question] (Implementation Monitoring)

2. Did each project have the desired physical habitat response within the target time frame, e.g., 3-5 years post-treatment? [project-scale question] (Effectiveness Monitoring)

3. Is the suite of projects implemented across a reach (~2 to 10 kilometers in length) leading to desired improvements in physical habitat (pool and side channel area) across response reaches? [reach-scale question] (Effectiveness Monitoring)

4. For LW and floodplain restoration projects, has the number of juvenile fish increased in restored vs. unrestored reaches in summer or winter? (Validation Monitoring)

Road removal or restoration projects

1. Was each project constructed as originally designed and if not, why? [project-scale question] (Implementation Monitoring)?

2. Have fine sediment levels, fine sediment infiltration, residual pool depth, and scour improved in downstream response reaches 3, 5, 7 or 10 years after road removal?

Riparian planting projects

1. Is the number, location, and species of plantings consistent with the proposal and planting plan? If not, why?

2. What is the planting survival rate in year 3, 5 and 7?

3. Has riparian cover, structure, and shade improved since project implementation?

Population level response to all projects

1. Has restoration of habitat under the In Lieu Program resulted in a statistically significant increase (compared to pre-restoration) in the numbers of smolts produced, the number of successful spawners (number of breeders), and smolts per spawner, for salmon and steelhead in the Swift Basin? (Validation Monitoring)

2. Has restoration led to improvements in habitat to support juveniles and adults at levels predicted by EDT model (Malone 2020)?

1.3 Monitoring Design and Replication

Basic monitoring designs that have been successfully used for programmatic evaluation of restoration typically use before-after (BA), before-after control-impact (BACI), and extensive post-treatment (EPT) experimental designs (Table 3.).

Table 3. Description of major approaches for monitoring and evaluating the effectiveness of regional restoration programs and the experimental designs they use. Modified from Roni et al. 2018.

Monitoring approach or design	Experimental design(s)	Description
Multiple Before-After Control-Impact (mBACI)	BA or BACI	Evaluation of multiple-projects using a before-after or before-after control-impact and standardized data collection methods so the data are analyzed collectively rather than by individual projects. Thus, including multiple treatment (impact) and control reaches or watersheds.
Extensive Post-treatment (EPT)	EPT (of treatment and control site)	Evaluation of multiple projects post-treatment (after restoration has occurred) using paired-treatment (restored) and control reaches and standardized data collection methods.
Intensively Monitored Watershed (IMW)	Various, most often BACI or BA	Evaluation of restoration efforts (cumulative effects of multiple projects or effects of large-scale projects) throughout a watershed, using standardized data collection methods, to determine the wider response of biota and physical habitat.
Hybrid	Combination of BACI, BA, or EPT	Use of any combination of the approaches to evaluate effectiveness of restoration projects or techniques. A combination of designs (BACI or BA and EPT) can also be used to monitor different indicators within the same project.

Each approach and design has its strengths and weaknesses (Table 4). However, a recent global review of approaches for evaluating entire restoration programs recommended a hybrid approach that uses a combination of a BACI or BA design and an EPT design as most appropriate depending upon the restoration actions and what type of physical and biological metrics are to be measured (Roni et al. 2018). Based on this review, and experience with the Salmon Recovery Funding Boards Project Effectiveness Monitoring Program (SRFB PE) and Bonneville Power Administration's Action Effectiveness Monitoring (AEM) Program, this Plan recommends monitoring physical response to LW and floodplain restoration using a simple BACI design, monitoring of riparian planting (if it occurs) and road removal using a BA design, and monitoring of reach-scale juvenile fish abundance to LW and floodplain projects using an EPT design (Table 5). As we discuss in detail in the population level monitoring section, because of lack of a suitable control basin, population level monitoring will use a BA design.

Table 4. Attributes of different approaches for evaluating effectiveness of regional restoration programs. Modified from Roni et al. (2018).

Attribute	Multiple before-after control-impact (mBACI)	Extensive post-treatment (EPT)	Intensively monitored watershed (IMW)	Hybrid
Can examine interannual variation in response?	Yes	No	Yes	Yes
Provides info on why some projects are more effective than others?	Yes	Yes	No	Yes
Results are broadly applicable?	Yes	Yes	No	Yes
Requires standardized data collection?	Yes	Yes	Yes	Yes
Length of monitoring (years)	5+	1-3	15+	3+
Cost (low, medium, or high)	H	M	H	M
Level (scale) of inference	Project & Program	Program	Program	Program

Table 5. Recommended monitoring designs for each restoration type. Year -1 refers to baseline monitoring one year before actual on the ground restoration, and Year 1 refers to monitoring one year after restoration.

Restoration type	Question	Design	Years	Sites
Large wood	Implementation	BA	-1, 1	All (10+)
	Effectiveness	BACI	-1, 3, 5	All (10+)
	Validation	EPT	5	All (10+)
Floodplain	Implementation	BA	-1, 1	All (10+)
	Effectiveness	BACI	-1, 3, 5	All (10+)
	Validation	EPT	5	All (10+)
Road removal	Implementation	BA	-1, 1	All
	Effectiveness	BA	-2, -1, 3, 5, 10	All
Riparian planting	Implementation	BA	-1,1	All
	Effectiveness	BA	-1,3, 5, 7, 10	All
Population monitoring	Validation	BA	3 to 5 before, 10 or more after	All

1.3.1 Reach-Scale Approach

Implementation monitoring will occur before and after restoration at the project (site) scale (specific location of restoration). If the restoration occurs in late summer, it is possible that the before-monitoring could occur in the same calendar year as the actual restoration. However, in many cases, due to the timing of actual on the ground restoration, pre-project monitoring would likely occur one year before on the ground restoration. Moreover, collecting baseline site and reach scale data 1 year before project implementation will provide important data necessary for project design while providing important base-line data on topography, elevation, channel form, and other data needed to evaluate project success. Temporal replication or a control site is not needed for implementation monitoring because it is largely focusing on assuring projects were constructed as designed. As such, it is sometimes referred to as compliance monitoring.

Physical effectiveness monitoring will use a BACI design, occur at the reach-scale, and monitor treatment and control reaches before and after restoration. When BA or BACI designs are used to monitor reach-scale biological changes (e.g., fish, macroinvertebrates), two or more years of pre-project monitoring and several years of post-project monitoring are needed to detect changes in biota[2]. However, for physical habitat metrics (e.g., pool area, depth, fine sediment levels) monitored as part of LW and floodplain restoration projects, interannual variability is much lower, and one year of pre-project monitoring is sufficient to quantify pre-project conditions. Similarly, monitoring of riparian restoration can be done with one year of pre-project monitoring. Road removal or restoration projects, which target reducing fine sediment and, in some cases, scour require at least two years of pre-project monitoring due to interannual variation in scour and fine sediment infiltration. Currently riparian restoration measures are not proposed for any of the priority EDT reaches identified above Swift Dam. However, we provide monitoring design and methods for riparian projects should they be identified as a restoration measures needed for some priority reaches when the In Lieu Program is finalized. Moreover, it is possible that riparian planting will occur as part of some floodplain restoration projects.

Another key component of the monitoring design is the total number of projects that will be monitored. Given the list of priority reaches, the number of projects implemented may be relatively low (e.g., < 25) and require monitoring of all projects rather than a random sample. The multiple BACI (mBACI) design used for effectiveness monitoring of floodplain and LW projects will provide information on individual projects before and after and can be rolled up for multiple projects (Roni et al. 2018). Studies that have used an mBACI design have often monitored less than a dozen projects (Baldigo et al. 2008; Roni et al. 2018). Given the need for information on physical effectiveness of individual projects and all projects combined, and the number of projects to be implemented, all floodplain and LW projects implemented as part of the Merwin In Lieu Program will be evaluated using an mBACI design.

[2] Note population monitoring of smolts and successful spawning adults using a BA or BACI design will require 3 or more years of pre-project data, this is discussed in detail in the Population Level Approach section.

Assessing whether changes in physical habitat are producing the desired biological results – validation monitoring – is equally important. The EPT design has proven highly successful to evaluate LW and floodplain projects both in the U.S. (Roni and Quinn 2001; Morley et al. 2005) and more recently in Europe (Haase et al. 2013; Hering et al. 2015; Göthe et al. 2016). Typically, this EPT design requires sampling 10 or more treatment and control pairs well after restoration has occurred. Treatments and controls are located 100m or more apart to ensure little movement of fish between paired-reaches (Roni and Quinn 2001; Roni 2019). Rather than providing detailed information about individual projects, it focuses on sampling a large number of projects to examine the average response to restoration for a group of projects. Additionally, because of the extensive spatial replication (i.e., large number of projects sampled), correlation analysis can be used to explain what restoration project characteristics produce the largest responses (Roni et al. 2005; 2018).

How many sites (paired treatments and controls) are necessary to detect a significant response depends upon the desired effect size and the variability of parameters of interest. Studies employing this design have successfully used as few as 6 to more than 30 sites to detect a significant response with this design, with most studies using 10 or more (Roni et al. 2005; 2013; 2018). Based on recently collected data from 29 wood placement projects in the Columbia River Basin (Clark et al. 2019), we estimate that approximately 8 sites would need to be sampled to detect a 50% percent increase in pool area, or 21 sites to detect a 50% increase in juvenile Chinook salmon abundance at treatment (restored) sites[3]. It should be noted that Clark et al. (2019) sampled sites across the Columbia River Basin, and we expect variability to be lower among sites within the Lewis River Basin. For example, if we use just the sites in the Upper Columbia Chinook salmon ESU (Twisp, Methow, Entiat, and Wenatchee basins, sampled by Clark et al. [2019]), the standard deviation of the juvenile fish response is much lower (1.85 vs. 2.48), and our sample size estimate is 12 sites to detect a 50% increase in juvenile Chinook numbers. Thus, consistent with previous studies, a sample size of 10 or more sites should be sufficient to detect a juvenile fish response using an EPT design and we will sample all LW and floodplain sites implemented under the Merwin In Lieu Program (it is expected that more than 10 sites will be restored within priority reaches and streams). The EPT design requires sampling all sites (treatment control pairs) once three or more years after restoration has occurred and thus data will be collected in a one- to two-year period. It can also be repeated at a later time so see if the average response changes over longer time frames.

A key component of the monitoring design will be selecting suitable control and treatment reaches. The treatment (restored) reach is determined by the restoration program and project, but location of a suitable control for a treatment reach will need to be determined once treatment areas are specifically defined. In general, a suitable control reach will be located 100 meters or more upstream of the treatment, though typically not more than two to five kilometers depending upon

[3] We used a two-tailed power analysis for a *t*-test (Zar 2010); alpha = 0.05, beta = 0.20 and a standard deviation for difference in pool area of 1.51 and 2.48 for juvenile Chinook salmon.

channel width (Roni et al. 2005; 2013; Roni 2019). This is to ensure minimal movement of fish between treatment and controls during low flow when sampling typically occurs. Given the length of priority streams and reaches (e.g., Clear Creek, Clearwater Creek, North Fork of Lewis), it is likely multiple treatments and control reaches will be identified in each stream. It is important that treatment and control reaches are similar (within ~10%) in channel type, gradient, confinement, bankfull width, elevation, riparian vegetation type (prior to treatment), land use, and other factors. The selection of suitable treatments and controls is particularly critical for the EPT design, which depends upon having paired control reaches that are similar to the treatment reach before it was restored. If no suitable control reach can be located, then the project will not be included in the monitoring program. The length of the reaches monitored at floodplain and LW projects should be a minimum of 20 times the bankfull width (BFW) or 500 meters in length, whichever is greater[4]. Many projects may span reaches that are several kilometers in length and exceed 20 times bankfull width. In these cases, to assure an adequate portion of the project is sampled, treatments and control reaches should be at least 50% of the restoration project length. Control reaches will be identified during the preliminary and conceptual design process, which should help ensure adequate number and location of control reaches for monitoring and evaluation of reach-scale success of the In Lieu Program. In addition to these data collected at the project and reach-scale, baseline data from recently required LiDAR and the updated assessment in the In Lieu Program, will provide information on broader-scale processes that may influence project physical effectiveness.

The EPT design will be effective in determining response to restoration for most species and life stages, though trapping data at Eagle Cliff in the North Fork of the Lewis River (PacifiCorp 2020) suggest that a substantial number of juvenile spring Chinook fry migrate to the reservoir in the spring or early summer and may not be enumerated with summer or winter sampling. To accurately estimate the reach-scale response of this life stage would require smolt trapping on paired treatment and control reaches in one or more tributaries using a BACI design. An initial assessment suggests this may not be possible in most tributaries due lack of road access, suitable trapping locations, and suitable treatment and control streams. The feasibility will also depend upon the specific location of restoration treatments in priority streams and reaches. Therefore, as compliment to the EPT monitoring described above and to examine the response of this spring Chinook life-history type to restoration, we will reassess the feasibility of conducting this reach-scale BACI monitoring in a tributary or priority reach once the specific locations of restoration have been determined.

1.3.2 Population Level Approach

Approaches that can be used to monitor a population level response of salmon and steelhead to habitat restoration in a basin include:

1. Before-after control-impact (BACI) monitoring of parr, smolt, and adult salmon and steelhead

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[4] 20 times bankfull width is considered the minimum reach length for monitoring changes in physical habitat and channel morphology (Harrelson et al. 1994; Rosgen 1994)

2. Before and after (BA) monitoring of parr, smolt, and adult salmon and steelhead
3. Basin-scale habitat monitoring
4. Rerun EDT or other models
5. Genetic monitoring

The main question that population level monitoring above Swift Dam would be designed to answer is:
Has restoration of habitat under the In Lieu Program resulted in a statistically significant increase in the numbers of smolts produced and adult salmon and steelhead successfully spawning above Swift Basin?

Because of the complexity and challenges of implementing population level monitoring, we first describe the potential approaches and their feasibility for evaluating the In Lieu Program before describing the preferred approach we will implement. As noted previously, restoration goals for the In Lieu Program and the locations of the actual restoration actions still need to be confirmed. These goals will influence the specifics of the populations level monitoring but are unlikely to influence the different options for population level evaluation of the In Lieu Program.

1.3.2.1 BACI monitoring of parr, smolt, and adult salmon and steelhead
Before-after control-impact (BACI) monitoring of smolts and adults before and after restoration in paired treatment (impact or restored) and control watersheds, has long been considered the best option for evaluating effects of management actions on fish and aquatic habitat (Bilby et al. 2005; Roni et al. 2015; Bennett et al. 2016). This is in part because of the success of early forestry studies that used this design. This monitoring approach is sometimes called the IMW (Intensively Monitored Watersheds) approach. Unfortunately, a number of studies have demonstrated the need for a long-time frame (>10 years) and logistical challenges associated with this (Reeves et al. 1997; Johnson et al. 2005; Roni et al. 2015; Bennett et al. 2016). Studies have also indicated that this approach is most tractable at a reach-scale or for small watersheds (< ~100 km^2) with intensive restoration where both the restoration and response to restoration are rapid such as that completed by Solazzi et al. (2000) on the Oregon Coast. The BACI approach is less appropriate for large watersheds and when restoration may occur over several years, or there is a lag in the physical and biological response to restoration (Roni et al. 2018).

There are several challenges for implementing this design to evaluate biological response to the In Lieu Program for any salmon or steelhead life stage. First, the design requires paired treatment and control watersheds. A control watershed could be outside of the basin, but it would require a similar history of fish passage and reintroduction, and similar watershed characteristics. There appears to be no suitable control watershed outside the North Fork Lewis River basin that has similar fish passage and reintroduction and no restoration or other management actions planned. Therefore, an in-basin control is needed. Given that habitat restoration for the In Lieu Program is targeted upstream of Swift Dam, the best option would be two similar watersheds draining into Swift

Reservoir—one that would have intensive restoration and one that would serve as a control. This is problematic because the restoration is likely to occur across several tributaries and there do not appear to be two similar streams that could serve as paired treatment and control watersheds. Treatment and control reaches will be monitored as part of project-level effectiveness, but this is reach-scale and not population or watershed level monitoring. Second, this design requires having adequate pre-project data on parr, smolts, or adults prior to restoration. That is not to say that smolt traps and parr and spawner surveys and possibly PIT tagging of fish to measure survival could not be initiated now to collect at least three or more years of pre-project data in specific tributaries. However, this approach would still require finding adequate treatment and control watersheds and focusing at least some of the restoration in one watershed. Third, is the time needed to detect a response. As noted previously, the IMWs do not have a great track record for this, and most have not been able to detect a response within 10 years and many suggest that more than 10 years of post-project monitoring will be needed to detect a response (Roni et al. 2015, 2018; Bennett et al. 2016). Assessment of adequate sample size and power needed to detect a population fish response would require data on interannual variability in treatment and control watersheds. Thus, the BACI design does not appear to be the most tractable approach for evaluating a population level response to the In Lieu Program.

1.3.2.2 Before and after (BA) monitoring of parr, smolt, and adult salmon and steelhead

Another option is simple before-after monitoring of juvenile (parr), smolt, and adult salmon and steelhead produced upstream of Swift Dam before and after restoration. This requires data on fish abundance or survival and habitat before and after restoration. Adult releases upstream of Swift Dam have been ongoing since 2013 (Table 6), though these are mostly hatchery (HOR), with some natural origin returning (NOR) adult coho salmon. Through 2018, spring Chinook and steelhead have been almost all HOR fish. In addition, juvenile spring Chinook salmon have been stocked in tributaries to the North Fork of the Lewis upstream of Swift Dam since 2012 (Table 6). There are two potential challenges for implementing the BA design. The first is that it is not clear if all the habitat has been fully colonized or if the fish numbers are still increasing. Moreover, there are targets set for the minimum number of fish transported upstream (e.g., 7,500, 2,000, and 500 for coho, spring Chinook, and winter steelhead, respectively) and to date, primarily HOR are trucked upstream to approach reintroduction targets. Thus, the transported fish do not represent the adults produced by existing habitat before restoration, which means it will be inappropriate to use them to compare to the number of adults post restoration to determine the success of habitat restoration under the In Lieu Program. The second challenge is, regardless of the reintroduction program, without a control it is difficult to tell if any response is due to the restoration or due to other factors. An out of basin control could be selected to account for natural variability, but in addition to issues noted above, it would not control for any changes due to the reintroduction program (transport of adults upstream). The current Lewis River Aquatic Monitoring and Evaluation Plan suggests a number of candidate populations of coho, steelhead and Chinook in the Lower Columbia region that might serve as reference populations (PacifiCorp and Cowlitz County PUD No. 1. 2017).

Suitable reference watersheds need to have accurate data on smolts, adults, and smolts per adult during the same time frame as the In Lieu Program (2013 to 2031). In addition, they should show temporal trends in abundance that track the Lewis River populations and thus help account for larger regional trends influencing salmon and steelhead abundance.

Ongoing efforts to enumerate smolts produced upstream of Swift Dam include the floating surface collector (FSC) and the Eagle Cliff Rotary Screw Trap (Table 6;
Table 7). While the data from the Eagle Cliff Screw Trap appear useful, the trap has relatively low efficiency (1 to 15%), is operated for a shorter period of time (April to June) than the FSC, and its efficiency varies by species and flow. The FSC data appear to be a better representation of the fish produced by all tributaries to the Swift Basin, and changes made in initial years of operation have improved efficiency (
Table 7). Fish are unlikely to exit Swift Reservoir unless they enter the FSC. Therefore, smolts that are not collected in the FSC either spend another year in the reservoir and emigrate as larger smolts or residualize in the reservoir. Because of this, it is problematic to use FSC efficiency estimates to estimate total smolt production.

To examine the number of years of data needed to detect a response using a simple before-after design, we used two methods: one based on a *t*-test and means and the other based on linear regression and trends before and after restoration. First, we looked at the number of years required to detect a stated difference in population means using *t*-tests (Zar 2010). Sample sizes were estimated separately for each species using smolt data from the FSC and number of adults transported upstream of Swift Dam. We estimated sample sizes for smolts, adults, and for coho, smolts per spawner. We only looked at smolts per spawner for coho, because sufficient data were not available for steelhead or Chinook. All *t*-test estimates were based on single-sided tests, with a stated significance level of 0.05, and a desired power of 0.8. We analyzed three effect sizes due to restoration representing 25, 50, and 100% increases in mean population (

Table 8). A number of improvements have been made to increase trap efficiency over the years, particularly in the first few years. We excluded 2013 and 2014 data from our power analysis for this reason. These estimates suggest that 4 to 7 years of monitoring would be needed to detect a 50% increase in adult salmon or steelhead. However, this assumes the existing pre-project data on adults released upstream of Swift Dam represent adult production from naturally produced juveniles, which they are not. Instead the upper basin has been stocked with primarily adult hatchery fish produced downstream of Merwin Dam. Because of this, the interannual variability in adult salmon and steelhead is much less than would be expected in a natural system, resulting in less time needed to detect a change.

Sample size estimates for smolts captured in the FSC, suggest that anywhere from 5 to 46 years of post-project monitoring would be needed to detect a 50% increase in smolt production at 0.05 level of significance. Years needed to detect a 25% response would be larger, while detection of a 100% increase or doubling of smolt numbers would require smaller sample sizes. Using a less stringent 0.10 level of significance would require slightly smaller samples sizes (

Table 8). Similarly, if one looks at coho smolts per spawner, the required number of years of monitoring is lower, though the use of smolts per spawner potentially multiplies any biases in smolts and adult estimates. Other combinations of effect size, power, and level of significance can be examined if desired.

Table 6. Estimated number of adult and juvenile salmon and steelhead transported and released upstream of Swift Dam 2012 to 2019. Data from Lewis River Fish Passage Program annual reports. The majority of adult coho and all spring Chinook and steelhead were hatchery origin fish (HOR). Targets for adult planting upstream of Swift Dam are 7,500, 2,000, and 500 for coho, spring Chinook, and steelhead, respectively. Thus, these data should not be considered adult returns from juvenile fish produced upstream of Swift Dam. Adult counts include jacks.

	Adults			Juveniles
Year	Coho	Chinook	Steelhead	Chinook
2012	0	0	0	15,440
2013	7,035	579	741	98,896
2014	9,179	0	1,033	65,012
2015	3,754	0	1,223	157,666
2016	7,346	0	772	29,900
2017	6,813	1,110	592	53,470
2018	7,060	700	1,225	0
2019	5587	109	1009	0

Table 7. Estimated smolts collected at Swift Floating Surface Collector (FSC) and associated trap efficiency. Fish cannot exit Swift Reservoir unless they enter the FSC so it is difficult to use FSC efficiency to estimate total smolt production. Trap efficiency for the Eagle Cliff Screw Trap is highly variable and not available for all species and not reported. Data from Annual Fish Passage Program Reports tables 3.1.3, 3.2.1 and 3.2.3.

	Floating Surface Collector Smolts			FSC Efficiency			Eagle Cliff Screw Trap		
Year	Coho	Chinook	Steelhead	Coho	Chinook	Steelhead	Coho	Chinook	Steelhead
2013	15,074	1,431	166	--	--	--	16,098	161	43
2014	7,659	2,164	539	29%	<1%	25%	189	214	96
2015	25,555	5,305	1,282	12%	<1%	19%	19,622	37	181
2016	48,333	3,114	2,095	31%	<1%	24%	7,164	77	3,832
2017	14,924	5,523	1,724	27%	11%	20%	33,385	20	2,366

2018	36,039	4,250	7,869	40%	24%	49%	22,974	588	3,195
2019	91,744	8,053	2,950	64%	51%	21%	31,071	4,120	4,855

Table 8. Results from preliminary power analysis to determine the number of years of post-treatment (restoration) that would need to be monitored to detect various levels of increased population (effect size) at a 0.05 and 0.10 level of significance (α) and a power of 0.80 (1-β) for adults, smolts, and smolts per spawner (coho only). Number of years are rounded up to nearest year. FSC = Floating Surface Collector.

Data set	Species	Power	Effect size	Years(n) α = 0.05	Years(n) α = 0.10
Adults	Steelhead	0.8	25%	18	13
Adults	Steelhead	0.8	50%	5	4
Adults	Steelhead	0.8	100%	3	2
Adults	Coho	0.8	25%	14	10
Adults	Coho	0.8	50%	5	3
Adults	Coho	0.8	100%	2	2
Adults (zeros removed)	Chinook	0.8	25%	25	19
Adults (zeros removed)	Chinook	0.8	50%	**7**	5
Adults (zeros removed)	Chinook	0.8	100%	3	2
FSC smolts (last four yrs.)	Steelhead	0.8	25%	182	133
FSC smolts (last four yrs.)	Steelhead	0.8	50%	46	34
FSC smolts (last four yrs.)	Steelhead	0.8	100%	13	9
FSC smolts (last four yrs.)	Coho	0.8	25%	43	31
FSC smolts (last four yrs.)	Coho	0.8	50%	12	9
FSC smolts (last four yrs.)	Coho	0.8	100%	4	3
FSC smolts (last four yrs.)	Chinook	0.8	25%	13	9
FSC smolts (last four yrs.)	Chinook	0.8	50%	4	3
FSC smolts (last four yrs.)	Chinook	0.8	100%	2	2
Smolts per spawner (no jacks)	Coho	0.8	25%	8	6
Smolts per spawner (no jacks)	Coho	0.8	50%	3	3
Smolts per spawner (no jacks)	Coho	0.8	100%	2	2

It is worth noting that these estimates assume that the full physical and biological effect of restoration has occurred and there was not lag time in response to restoration or the restoration actions did not occur over several years. Including years while restoration is occurring will likely reduce the ability to detect a significant change.

Given that implementation of restoration projects will likely occur over a 5 to 8 year period, additional years of data will likely be needed to detect a response. To demonstrate this, we built a bootstrap power estimator (Manly 2007, 2011) and tested the impact of including years during restoration implementation (construction) or a lag time in restoration response using Chinook smolt data from the FSC. This analysis demonstrated that including one sample that had a less than 50% response, could reduce statistical power by roughly one third (see Appendix 1 for details) unless additional years of data are collected. This highlights that the estimates from above are likely conservative and, despite its wide use for analysis of before-after and BACI studies, the *t*-test approach may not be the best suited for examining watershed-scale response to restoration that occurs over a protracted period.

Given the restoration project timeline and the limitations of comparing the means before and after restoration, an analysis of trends in fish abundance may be more appropriate. To estimate the number of years of monitoring needed to detect a response in smolts using a trend analysis, we simulated future FSC smolt data and used a linear regression to test if there was statistical evidence for differing intercepts, or slope coefficients between the “before” and “after” data. Tests were run for multiple extra years of data to quantify the effect additional sampling years has on the ability to detect a difference between smolt numbers pre- and post-restoration. We tested three trends: 5, 10, and 15% annual growth rates which, after five years, equate to roughly 28, 61, and 100% increases to the population. We considered each species separately, and all bootstrap estimations relied on 1,000 simulations (Table 8). Given the issues with adult data, we focused on the smolt data from the FSC for all three species as well as coho smolts per spawner. Overall, the bootstrap estimates show the number of years of monitoring post-treatment (restoration) increases as our effect size decreases from a 15% to 5% annual level of increase. For a trend of 15% annual increase, it could be as little as seven years of post-treatment monitoring for spring Chinook to more than 45 years for steelhead at 0.05 level of significance. The variability in the data is largely driving the number of years of data needed to detect a significant trend, though using a less conservative 0.10 level of significance also reduces the number of years of post-treatment monitoring needed (Table 9). Moreover, if one examines coho smolts per spawner, which has lower interannual variability than smolts, even fewer years of post-treatment monitoring are needed. The benefit of the trend analysis versus comparing means before and after restoration is that all monitoring data during restoration can be used and should not limit our ability to detect a change. In either case, there are at least two important caveats. First, for the largest effect size, estimated sample sizes are less than one generation for some species, which is probably not realistic and a minimum of 5 years post-treatment monitoring will be needed. Second, given that to date the FSC has an efficiency of less than 50%, the number of smolts collected and passed downstream of Swift Dam do not represent total smolt production.

Table 9. Results from bootstrap estimations of years of post-treatment monitoring needed to detect population trends in smolt production or smolts per spawner (coho only; no jacks) given a power of 0.80 (1-β) and a 0.05 or 0.10 level of significance (α). FSC = Floating Surface Collector.

Data set	Species	Effect size	Power	Years (n) α= 0.05	n Years(n) α= 0.10
FSC-last four years	Coho	15% annual	0.8	12	8
FSC-last four years	Coho	10% annual	0.8	16	11

FSC-last four years	Coho	5% annual	0.8	25	20
Smolts per spawner	Coho	15% annual	0.8	6	5
Smolts per spawner	Coho	10% annual	0.8	8	6
Smolts per spawner	Coho	5% annual	0.8	131	11
FSC-last four years	Chinook	15% annual	0.8	7	5
FSC-last four years	Chinook	10% annual	0.8	10	7
FSC-last four years	Chinook	5% annual	0.8	16	13
FSC-last four years	Steelhead	15% annual	0.8	45	13
FSC-last four years	Steelhead	10% annual	0.8	>45	18
FSC-last four years	Steelhead	5% annual	0.8	>45	30

1.3.2.3 Basin-scale habitat monitoring

While not true population level monitoring, monitoring the improvement in habitat conditions across the Swift Basin could be used as a surrogate for monitoring fish response. This would be based on the premise that, given all the confounding factors and long timeframe needed to detect a fish response, measuring an improvement in habitat is tractable and a reasonable substitute for fish. This would demonstrate whether the In Lieu Program has significantly improved conditions for salmon and steelhead in the Swift Basin. This would require surveying habitat across all anadromous fish streams in the Swift Basin either as census or at randomly selected sites using generalized random tessellation stratified (GRTS) sampling. The surveys would be conducted before and after all restoration is completed to quantify the impact habitat restoration actions have had on the habitat quantity and quality. These surveys would include measuring and quantifying the amount and quality of different habitat types (e.g., side channel, pool, riffle, glide) and amount of habitat for different salmonid life stages (e.g., summer, winter, spawning). While habitat surveys were done in selected tributaries upstream of Swift to populate the EDT model, they were not comprehensive. These habitat data could be used to estimate juvenile and adult capacity using EDT, limiting factors, or other similar habitat models.

1.3.2.4 Run EDT or other models

Another approach would be to rerun the EDT model, the limiting factors model, or increases based on capacity estimates (e.g., Roni et al. 2010) for the reaches where restoration is planned (PacifiCorp 2016), with new data collected once the restoration has been completed. The resulting number of spawners, juvenile capacity, survival, or other EDT population metrics supported by newly improved habitat could be compared to the original predictions made prior to implementation of the restoration to see if they meet or exceed original predictions. This would be a model-based approach, but consistent with information used to make the preliminary decision for the In Lieu Program. A potential short-coming is that the most recent (2016 to 2020) model runs of EDT are not entirely based on detailed habitat data for all tributaries in the Swift Basin. Use of this approach would require high quality habitat data for the entire Swift Basin or, at a minimum, where restoration will occur and rerun EDT before the restoration occurs. The habitat could then be remeasured after restoration to ensure that the comparison of model runs was based on consistently high quality data before and after restoration. Consistent assumptions about passage efficiency, survival, and other factors would need to be used for before and after restoration model runs and consistent with EDT model run used to inform the In Lieu decision (i.e., Malone 2020). As part of physical monitoring of the In Lieu Program, habitat data will be collected in reaches where restoration will occur both before and after restoration. Thus, data for at least the reaches scheduled for restoration will already be collected as part the monitoring of the habitat monitoring of the In Lieu Program.

Another habitat-based model, which was described in Appendix B of PacifiCorp (2016) and based on Roni et al. (2010), uses empirical estimates of increases in parr and smolts from existing studies on restoration effectiveness and amount of improved habitat (area or length) to estimate potential increases in salmon and steelhead production from restoration (Roni et al. 2010). This "restored area model" has been shown to provide reasonable estimates of smolt production from restored habitat (Ogston et al. 2014), and use Monte Carlo simulations to provide prediction intervals showing the range of expected responses (Beechie et al. 2015). Estimates of increases in salmon and steelhead reported in Appendix B of PacifiCorp (2016), would need to be updated with the new priority reaches identified by NMFS, but appear to be within range of estimates provided by EDT modeling. These numbers could also be compared to the reach-scale fish monitoring to confirm whether the restoration is leading to the expected increases reported in published studies evaluating restoration effectiveness.

1.3.2.5 Genetic monitoring

Similar to the monitoring used to determine the success of a reintroduction program and effective population size, genetic mark-recapture monitoring based on parentage and/or relatedness-based analysis could be used to determine whether the number of adults successfully contributing to the population (effective breeders) on an annual basis has increased following restoration (Rawding et al. 2014; Schreier et al. 2015; Whiteley et al. 2015; Steele et al. 2019). This would require collecting tissue samples (fin clips or other material) from all or a sub-sample of adult salmon and steelhead passed upstream of Swift Dam several years before and after restoration occurs (ideally 5 years before and 5 years after restoration). Tissues samples from a subsample of smolts collected at the Eagle Cliff Screw Trap or the FSC would also be collected before and after restoration. Parentage analysis would allow direct observation of which adults are successfully contributing offspring to the population (number of breeders), the proportion of spawners present that successfully reproduce, and how many juveniles are produced from successful spawners (smolts per breeder). This is important given the current FSC efficiency which is below 50% and the population above Swift Dam will need to be supplemented with hatchery fish until trap efficiency improves. Several FSC modifications have been made and additional actions are underway to improve the efficiency of the facility. The genetic monitoring will be particularly important for steelhead, which may see contributions not only from anadromous adults but resident rainbows and, because of their variation in smolt age, smolts from a single breeder outmigrating over multiple years.

Prior to initiating genetic monitoring, an analysis of the number of juveniles that need to be sampled at the FSC for each species needs to be conducted. The genetic sampling could be taken a step further and tissue samples could be collected from female carcasses in restored and unrestored reaches before and after restoration or from fry or parr rearing in restored and unrestored reaches. These data could be compared to parentage of smolts sampled in the trap to see if the number of successful spawners (breeders) increases in restored reaches following restoration and whether the smolts per breeder or spawner increased. However, collected tissue samples from carcasses in many reaches before and after restoration is more labor intensive and pre-project evaluations necessitate that fish are currently spawning in areas potentially scheduled for restoration. Thus, while collecting samples from adults passed upstream and sub-sampling juveniles at out-migration traps is straightforward, strategic collections of carcasses or fry in tributaries to support In Lieu Program evaluation would need to be tested for feasibility and efficacy. In addition, some modification of the frequency and extent of spawner surveys under the current Lewis River Aquatic Monitoring and Evaluation Plan may be needed to ensure spawner surveys occur in restored reaches annually.

1.3.2.6 Recommended Population Monitoring Approach

Each of the five potential population monitoring approaches described above has strengths and weaknesses (

Table 10). The BACI approach, while often recommended, is not feasible for the In Lieu Program unless it was conducted on a few small tributaries. The BA monitoring of adults or smolts per spawner seems attractive in part because sample size estimates suggest 5-7 years of post-restoration monitoring might be needed to detect a 50% increase. However, the pre-restoration adult data are largely planted hatchery origin fish and do not likely represent a true baseline. Any fish monitoring using simple before-after design should focus on smolts enumerated with the FSC using a trend analysis for smolts and smolts per spawner. This seems tractable for coho and Chinook smolts though it may take 10 to 20 years to detect a response and even longer for steelhead given the variability in current pre-project (restoration) data. However, at less stringent level of significance ($\alpha = 0.10$), a response for Chinook and coho smolts may be detectable in less than 10 years assuming response is 50% or greater. Similarly, examining smolts per spawner may allow detecting a change sooner, though that is dependent on accurate data on smolts and adults. Monitoring smolts and adults assumes there will be adult fish to transport above Swift, which may not be the case for spring Chinook. The numbers of adults in particular could be influenced by changing climate and low ocean survival. Habitat monitoring can be done at a basin scale and, while fish numbers could be inferred from the habitat data, it is not a direct population measure. Rerunning the EDT model or other habitat-based model for the specific reaches where restoration will occur should be relatively straightforward assuming new habitat data are collected, though similar to habitat monitoring, it is not a direct measurement of fish response. Genetic monitoring of the effective breeding size is a promising approach that would require collecting genetic data on all or most of adults transported upstream of Swift and a subset of smolts collected at the FSC.

One of the advantages of the population level monitoring versus reach or project level monitoring of salmon and steelhead response to restoration, is that viable salmon population (VSP) parameters (i.e., abundance, productivity, spatial structure, and diversity) used to determine conservation and listing status of salmon (McElhaney et al. 2000, Crawford and Rumsey 2011), can be monitored with some of these approaches. Most of the approaches except the basin-scale habitat monitoring look at fish abundance. Population growth rate and smolts per breeder or spawner (productivity) would be examined with the BA approach and genetic monitoring. Genetic mark-recapture monitoring (sometimes called parentage-based tagging) could be expanded to examine spatial structure and diversity though these would not likely be expressed until several generations, particularly if supplementation with hatchery fish continues. Moreover, spatial structure and diversity are likely better suited for examining success of the reintroduction program than they are as measures of success of habitat restoration.

Given these strengths and weaknesses of different approaches and limitations of adult and smolt data, using a combination of approaches is the best method to measure population level response to the In Lieu Program. Therefore, the following will be conducted:

1) before and after monitoring of smolts using the FSC to measure changes in smolt numbers and smolts per adult over the long-term;

2) begin collecting genetic samples from all or a suitable sample of adults transported upstream of Swift Dam (2020), and a subset of juveniles at FSC (2021) to measure successful breeders and smolts per breeder;

3) use before and after habitat data collected in restored reaches and EDT modeling to determine if habitat improvements can support juveniles and adults at or above levels predicted by EDT model before restoration; and

4) based on actual amount of habitat restored, use empirical estimates of increases in parr and smolt production from published studies to estimate range of increase in salmon and steelhead due to the In Lieu Program.

While no true control exists for before and after monitoring of smolts and adults, trends in smolts and smolt to adult production from nearby watersheds will be useful for informing whether changes in smolt and adult metrics are due to restoration or other larger climatic or regional conditions (e.g., climate change, poor ocean conditions). The reference populations described in the Lewis River Aquatic Monitoring and Evaluation Plan should be good candidates for this purpose. The genetics sampling will be important not only for determining influence of restoration on survival, but also important information on reproductive success and contribution of hatchery and natural origin fish. Finally, given that there will likely not be enough time post-restoration to detect a response in smolts or smolts per spawner, the third component, EDT modeling, will be particularly important for informing the in lieu decision for Yale facilities.

Table 10. Summary of strengths and weaknesses or challenges in implementing five different approaches for monitoring population level response the In Lieu Program.

Approach	Strengths	Weaknesses/Challenges
BACI	• Widely accepted approach	• No control • Most successful on very small watersheds
BA – adults, or smolts FSC	• Data readily available, counted since 2012 • Additional before data will be collected prior to restoration • Measures two VSP parameters (abundance and productivity)	• Adult data do not represent returns but planting of fish • Smolts – trap efficiency, progeny of planted adults, some fish residualize or out-migrate in later years • Lack of control watersheds means that other factors may be responsible for any increase detected • Some modifications to current smolt and adult monitoring protocols may be needed
Habitat	• Direct measure of what restoration will change • Restored reaches will be monitored as part of In Lieu Program • Could be used as basis to rerun EDT or other models post-restoration to estimate capacity	• Does not directly measure fish numbers • To be truly population level, would need to measure all anadromous habitat • Does not measure any VSP parameters
EDT	• In lieu decision partly based on EDT predictions, could be easily rerun following restoration • Measures two VSP parameters (abundance and productivity)	• Model based approach, will need to rerun before restoration with new data
Restored Area Model	• Initial estimates similar to EDT predictions • Based on data from published studies on restoration effectiveness • Monte Carlo simulation provides 95% prediction interval	• Needs to be run on actual length and area of stream restored • Limited to a few restoration types with empirical data (large wood, floodplain reconnection)

Approach	Strengths	Weaknesses/Challenges
Genetics	• Focuses on effective population size or breeders and smolts per breeder • Relatively easy to measure • Useful for larger Lewis River program • Could be used to measure all four VSP parameters	• No previous data are available for coho and Chinook, a subsample of steelhead are currently sampled to examine introgression with resident fish • Limited time to collect pre-restoration data • Some modifications of existing monitoring and evaluation needed

1.4 Monitoring Parameters and Sampling Approaches

1.4.1 Large Wood Placement

The objective of LW placement projects in the Lewis River Basin is to create pools and increase pool area and quality (complexity, depth) by increasing the amount of LW interacting with the low-flow channel. Implementation monitoring of LW projects is fairly straightforward and entails counting the number and pieces of LW and LW structures observed after restoration and comparing those to the original proposal and design. These metrics can be quantified adequately with traditional habitat surveys, though improved mapping abilities with LiDAR (fixed wing or drone) or real time kinematic (RTK) GPS or total station provide more accurate and precise quantification of channel morphology and habitat units than a traditional habitat survey. Therefore, this Plan includes conducting detailed habitat surveys of the active channel in treatment and control reaches using an RTK GPS coupled with LiDAR data to survey and map channel morphology, topography, and classify habitat units (Bangen et al. 2014; CHaMP 2016; Roni et al.2019*a*) (The same two or three snorkelers will snorkel paired-treatment and control pairs and all snorkel surveyors will undergo training each season to ensure consistent count (Johnson et al. 2007). Bounded snorkel-counts or mark-recapture estimates will be done in a subset of habitats surveyed to provide confidence intervals around abundance estimates from snorkel surveys (Schill and Griffith 1984; Johnson et al. 2007).

Table 11). Habitat units will be identified and classified into pools, riffles, glides and other habitat units using a modification of the Hawkins et al. (1993) protocol (CHaMP 2016).

To help understand if placed LW had the desired effect, monitoring will use the geomorphic unit tool (GUT) (Wheaton et al. 2015), which provides a detailed mapping of micro-habitat and geomorphic conditions within the active channel and allows one to see the type of geomorphic conditions (e.g., bowl, trough, saddle, mound, bank/wall) created by LW or structure (**Error! Reference source not found.**). More importantly, it helps explain why a structure has or has not created the desired geomorphic change. In addition, areas of sediment erosion and deposition can also be quantified by using geomorphic change detection (Wheaton et al. 2010).

Juvenile fish abundance will be enumerated during summer (mid-July to mid-September) and winter (January to mid-March) low flow using standard snorkel survey protocols widely used to monitor and evaluate juvenile salmonid abundance (Thurow 1994; Roni and Fayram 2000)[5]. Snorkeling was chosen because it has been widely used to enumerate fish and evaluate changes in juvenile salmonid abundance from habitat restoration (Roni and Quinn 2001; Roni 2005; Clark et al. 2019), and other methods (mark-recapture or multiple-removal) are not feasible given the length and size of streams to be surveyed. Snorkel surveys will include two or more snorkelers entering the downstream end of a reach and slowly moving upstream in unison through channel units, stopping to occasionally relay the observed fish numbers, sizes, species, and micro-habitat associations (e.g., slow or fast water, off-channel or side channel habitat, LW or boulder association) to the data recorder. The same two or three snorkelers will snorkel paired-treatment and control pairs and all snorkel surveyors will undergo training each season to ensure consistent count (Johnson et al. 2007). Bounded snorkel-counts or mark-recapture estimates will be done in a subset of habitats surveyed to provide confidence intervals around abundance estimates from snorkel surveys (Schill and Griffith 1984; Johnson et al. 2007).

Table 11. Summary of monitoring protocols (surveys) and key parameters and metrics calculated for each restoration type.

	Survey type (protocol)	Parameters and metrics
Large wood placement	Large wood	Number, length, width, volume, location, function (Roni and Quinn 2001; Clark et al. *In press*)
	Channel morphology and topography	Habitat type (e.g., pool, riffle, glide, cascade), area, and volume, residual pool depth (Lisle 1987; Hawkins et al. 1993; CHaMP 2016), morphological quality index (MQI; Rinaldi et al. 2018), change in DEM, geomorphic change, geomorphic unit tool (GUT) (Bangen et al. 2014; Wheaton et al. 2015)
	Snorkel surveys	Summer (mid-July to mid-Sept) and winter (January to mid-March) juvenile fish abundance by species (fish/m^2) (Thurow 1994; Roni and Fayram 2000).
Floodplain restoration	Large wood	Number, length, width, volume, location (low flow, bankfull, floodplain), function (pool forming, cover)
	Channel morphology and topography	Habitat type (e.g., pool, riffle, glide, cascade), area, and volume, residual pool depth (Lisle 1987; Hawkins et al. 1993; CHaMP 2016); morphological quality index (MQI; Rinaldi et al. 2018); change in DEM, geomorphic change, geomorphic unit tool (GUT) (Bangen et al. 2014; Wheaton et al. 2015); side channel length, area, number of junctions, ratio, wetted area at bankfull flow (Beechie et al. 2017).
	Snorkel surveys	Summer (mid-July to mid-Sept) and winter (late Dec to early March) juvenile fish abundance by species (fish/m^2) (Thurow 1994; Roni and Fayram 2000).
Road removal	Channel Morphology/ Long-profile	Residual pool depth (Lisle 1987), Long-profile habitat survey(Mossop and Bradford 2006)

[5] Summer snorkel surveys would occur during daytime while, winter surveys would need to be conducted at night as juvenile salmonids are nocturnal when temperatures are below 9℃ (Roni and Fayram 2000). Snorkel surveys have been used widely to evaluate juvenile salmonid response to restoration particularly where there are listed fish species.

	Survey type (protocol)	Parameters and metrics
	Sediment (egg boxes, bulk samples, pebble counts)	Percent fines bulks samples, depth to fines (V*; Lisle and Hilton 1992); scour and fine sediment infiltration (Johnson et al. 2012), sediment size (Wolman 1954)
Riparian planting	Plant survival	Planting survival, growth, browse damage
Population level monitoring of all project	Smolts abundance (FSC), Genetic mark-recapture sampling of smolts and adults	Smolt number by species, parentage, effective population size, number of successful breeders, and smolts per breeder, smolts per spawner

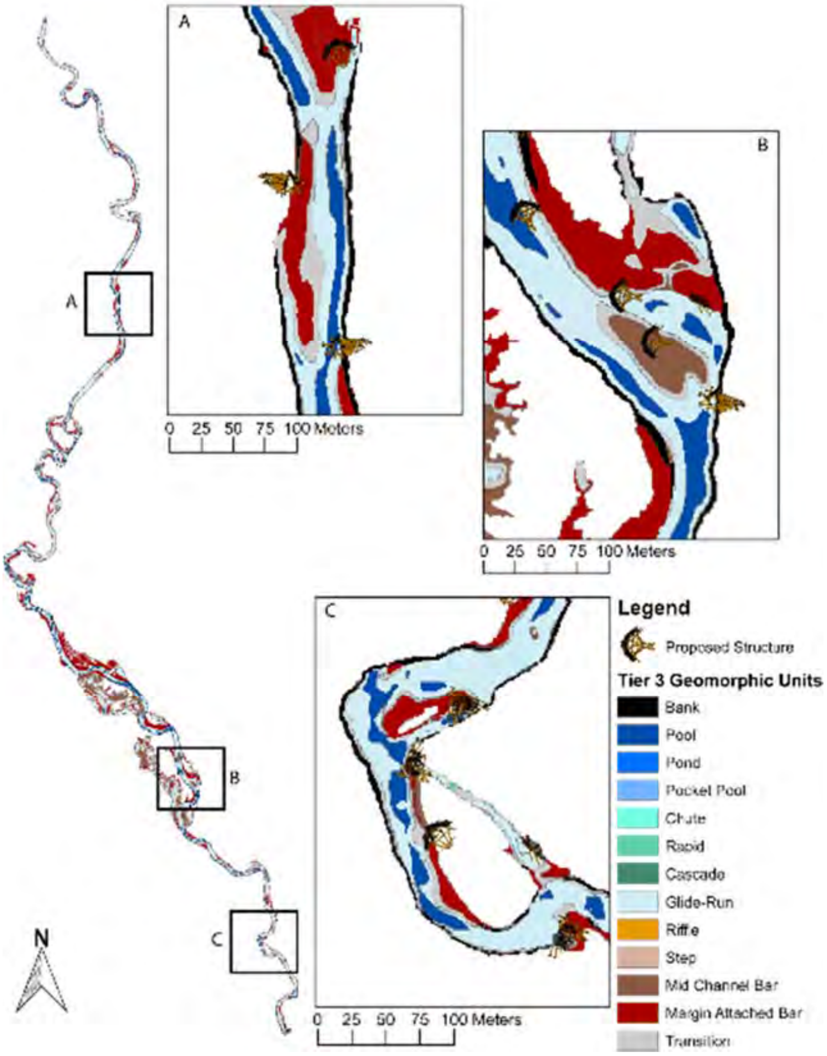

Figure 3. Example of pre-restoration geomorphic units in the Middle Entiat River bankfull channel delineated using topographic data (Lidar combined with RTK GPS), the geomorphic unit tool (GUT) and proposed location of LW structures. Repeating the surveys and GUT analysis post-treatment will allow researchers to determine if the structures have or have not met their design objectives.

1.4.2 Floodplain Restoration

Floodplain restoration projects, likely to consist of reconnecting and constructing side channels and assisted by LW structures, will use the same physical and biological methodologies as LW projects. However, in addition to information on habitat and channel morphology collected using an RTK GPS, floodplain connectivity and quality and side channel functionality will also be measured and quantified based on LiDAR data collected using either a drone or a fixed wing aircraft. In addition to the GUT and other methods of estimating geomorphic change, before and after restoration conditions will be compared using the multi-metric morphological quality index (MQI) developed by Rinaldi et al. (2018). The topographic survey will allow characterization of floodplain extent and connectivity at multiple flows (Figure 4**Error! Reference source not found.**). Metrics developed for monitoring floodplains in Puget Sound outlined by Beechie et al.

(2017), including side channel length, area, number of junctions, ratio, wetted area at bankfull flow, will be used.

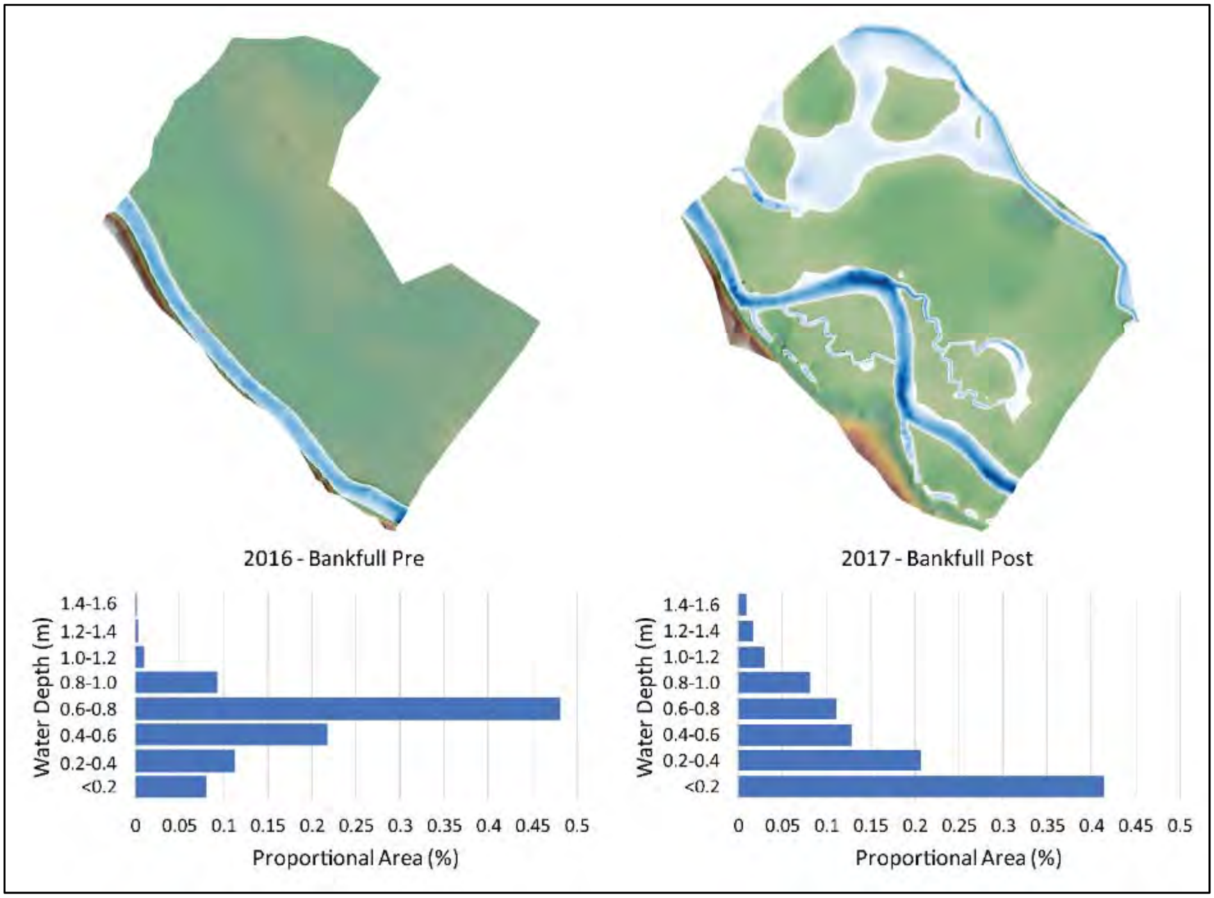

Figure 4. Example of a topographic survey output showing water depth distribution at bankfull flow before and after floodplain restoration for Catherine Creek, Oregon.

1.4.3 Road Removal

While removal of forest roads can be used to reduce both landslides and fine sediment (Beechie et al. 2005), road removal projects in the Lewis River Basin have been identified primarily to reduce levels of fine sediment caused by high road density. Thus, monitoring will focus on determining the in-channel parameters and metrics most likely to respond to changes in road density and sediment delivery, including: fine sediment levels, scour, sediment size (e.g., D16, D50, D84) (Wolman 1954), fine sediment infiltration (Johnson et al. 2012), residual pool depth (Lisle 1987), and fine sediment in pools (V*; Lisle and Hilton 1992) (The same two or three snorkelers will snorkel paired-treatment and control pairs and all snorkel surveyors will undergo training each season to ensure consistent count (Johnson et al. 2007). Bounded snorkel-counts or mark-recapture estimates will be done in a subset of habitats surveyed to provide confidence intervals around abundance estimates from snorkel surveys (Schill and Griffith 1984; Johnson et al. 2007).

Table 11).These will be monitored in the response reach immediately downstream of the proposed road removal project(s) and upstream of any major tributaries. The exact extent and location of the reach will need to be determined once the road removal projects have been identified. A longitudinal profile type habitat survey will be used to characterize pool quality and channel morphology and quantify changes in residual depth and pool quality (Lisle and Hilton 1992; Mossop and Bradford 2006). Scour and fine sediment infiltration into spawning gravels will be examined using scour chains and Whitlock-Vibert boxes as described by Johnson et al. (2012). Bulk shovel sediment samples and pebble counts in pool tailouts/riffle crests will be collected to estimate particle size and further characterize fine sediment levels before and after road restoration (Wolman 1954; Grost et al. 1991).

1.4.4 Riparian Planting

As noted previously, riparian monitoring will initially focus largely on whether planting followed the contractor's planting plan, followed by longer term periodic monitoring to examine plant survival and riparian structure, cover and shade. This would require simple before and after monitoring of the riparian planting at multiple belt transects at each planting site. Methods would be based on the protocol for monitoring riparian and invasive vegetation removal projects in the interior Columbia River Basin (Roni et al. 2019b), which is based on methods of Harris (2005; Lennox et al. (2011), Merritt et al. (2017) and others. The number of transects at each site would depend on the length along the stream with a target of 20 percent of the reach length (Lennox et al. 2011; Gornish et al. 2017). Species composition, vegetation cover, and canopy cover would be measured within each belt transect and all plantings marked on first post-treatment survey so that plant survival could be measured. Additionally, bud browse, beaver damage, living or dead condition, and evidence of planting (tubing, marking, mulch, or fencing) would be recorded. Surveys would occur during the summer months (July and August).

1.4.5 Population Level Biological Monitoring

Smolts and Adult Enumeration

Monitoring of smolts at the FSC and adults have been ongoing since 2013 as part of the Settlement Agreement and are described in detail in the overall Aquatic Monitoring and Evaluation Plan for the Lewis River (PacifiCorp and Cowlitz County PUD No. 1 2017). As noted previously, collection of genetic material either as fin clips, swabs of slime, or other tissue will be collected from suitable sample of adult salmon and steelhead passed above Swift Dam, and juveniles collected at the floating surface collector. The number of adults released above Swift Dam can influence smolt production and smolts per spawner. Thus, during implementation of the In Lieu Program, it will be important to maintain a relatively consistent number of adults transported above Swift Dam. Therefore, PacifiCorp will try to release the targeted number of coho, spring Chinook, and steelhead adults above Swift (7,500, 2,000, and 500 for coho, spring Chinook, and steelhead, respectively). All natural origin adults collected at the Merwin trap will be transported upstream even if they exceed these targets, though to date most fish transported to meet annual adult targets have been hatchery fish and it will be important to reduce these numbers as more naturally produced fish return.

Genetic sampling

Collecting tissue samples from all adults and juveniles for genetic analysis would be ideal, but cost prohibitive and not necessary to accurately estimate population size (number of successful breeders). The ideal sample size will be a trade-off between cost, what is operationally feasible, and required sample size needed to estimate the number of breeders with a desired level of accuracy. Unfortunately, estimating sample sizes to accurately estimate number of successful breeders is not as straightforward as other power or sample size estimations because two separate sample sizes effect the analysis: the number of adult breeders tagged (sampled), and the number of juveniles sampled. However, the estimate relies on a Petersen estimator (Seber 1982), which defines an estimate of the coefficient of variation for the population estimate based on three values: 1) the number of animals in the system (escapement), 2) the number of animals tagged in the first sampling event (adults genotyped), and 3) the number of animals sampled in the second sampling event (juveniles sampled). Note, that each juvenile sampled is really two samples due to having two parents, and thus, two potential genotypes to match.

Although this formula is a rough approximation, it does provide some guidance on the overall sample sizes required, and the trade-offs between adult and juvenile samples. For demonstration purposes, we used the approach to estimated coefficient of variation (CV) of the population estimate (i.e. number of breeders) based on different combinations of adults and juvenile samples assuming the number adult salmon or steelhead is 1,000, 5,000, or 10,000 (Figure 5). Note that there are multiple combinations that result in similar levels of CV. For example, for an escapement of 5,000, genetic sampling of 1,500 adults and 250 juveniles would lead to similar precision (as measured by CV) as genetic sampling of 500 adults and sampling 1000 juveniles. Regardless of the exact number of samples needed, it will be important to ensure a representative sample of adults and juveniles are sampled throughout the return or outmigration period (Rawding et al. 2014). For adults, this will be done by collecting a systematic sample of every nth adult to meet sample size requirements. For juveniles, a similar approach will be used, with genetic samples (fin clip or swab) collected from a representative sample of smolts of each species each week throughout the smolt outmigration period. Because the sample size required depends in part on the total number of fish arriving at the FSC each day or week and the major cost is in processing not collecting the samples, the goal will be to “oversample” so that once the run is completed, researchers can select a representative sample of all samples collected throughout the season. Genetic samples will also be collected from spring Chinook and coho carcasses during spawner surveys to determine the feasibility of carcass samples in determining where successful spawning is occurring and provide further insight into restoration effectiveness. This will require coordination and some modification of current spawner surveys to collect genetic material and ensure coverage of restored reaches. Previous spawner surveys have recovered relatively few carcasses. Therefore, if sampling of carcasses is not effective because of low number of carcasses recovered during spawner surveys, tributaries will be sampled in the spring or early summer to collect tissue samples from fry in known spawning areas.

This approach provides preliminary estimates of sample size for genetic population monitoring of salmon and steelhead for the In Lieu Program for planning purposes. However, these estimates are likely conservative because the number of adults released upstream of Swift Dam are known and we are trying to determine how many of these successfully reproduced. Thus, rather than genetic-mark-recapture to estimate spawner abundance (Rawding et al. 2014), we are focused on parentage and kinship analysis to determine successful breeders and smolts per breeder. This should require a smaller number of samples than estimated above. To more accurately predict the number of samples needed in absence of actual data, a simulation approach could be used. This more focused analysis can integrate population and site-specific parameters to more accurately represent the conditions of the study. Multiple simulations can be run to test the sensitivity of the population estimate to various parameter assumptions and sampling levels (e.g. Bootstrapping). It is also important to note that the sampling and analysis is more complicated for steelhead than Chinook or coho, because of the more complex juvenile life history and the possibility of resident *O. mykiss* contributing to the population. Operationally, sample sizes can be refined once sampling begins and the level of effort and cost required to collect and process juvenile vs. adult samples in the Lewis River becomes clear.

EDT Modeling Before and After Restoration

The habitat data needed for this approach will be collected in reaches scheduled for restoration under the In Lieu Program as part of the physical monitoring described above. The detailed stream habitat data will be collected before restoration for stream reaches scheduled for restoration[6]. The latest EDT model (Malone 2020) for these streams and reaches will be rerun prior to restoration to estimate population metrics of juvenile and adult productivity, capacity, abundance and diversity for Coho, Chinook and steelhead. This model run will define baseline conditions prior to restoration. Post-stream restoration habitat data will be collected in the same streams as for the baseline. The EDT model will be rerun for each species and the population metrics again calculated. The percent difference in each population metric for the baseline and restoration model runs will define the “lift” in population performance expected from stream restoration for each reach and individual stream. These predictions from the EDT model run will also be compared to the pre-restoration Malone (2020) EDT model run used to help inform the In Lieu decision.

In addition, using the post-project on habitat area, length, and condition, coupled with empirical estimates of increases in salmon and steelhead parr and smolts (Roni et al. 2010; Beechie et al. 2015), researchers will estimate the expected increase in fish due to In Lieu restoration. This will include published values on increases in salmon and steelhead parr and smolts for large woody debris (LWD), engineered log jam (ELJ) and side-channel reconnection or creation (Roni and Quinn 2001; Morley et al. 2006; Pess et al. 2012; Clark et al. 2019). Using these data and a Monte

[6] In earlier model runs, habitat data was summarized primarily by stream. In new runs, the habitat data will be organized consistent with the boundaries of the restoration area in each stream. This approach will allow researchers to estimate population parameter change at the reach, stream and basin scales for any life stage.

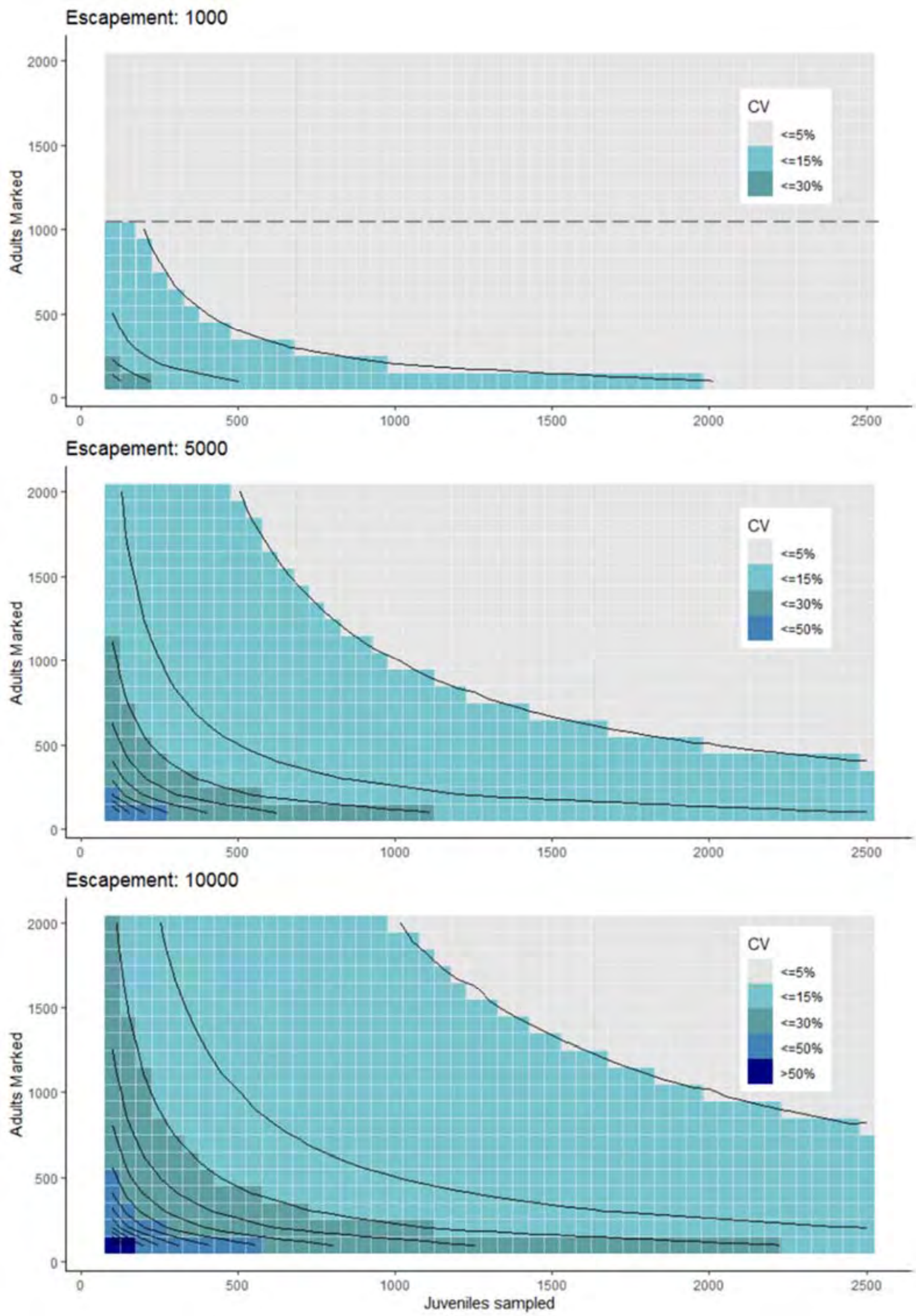

Figure 5. Estimated coefficient of variation for the breeder population estimate using formula from Seber (1986) that relies on escapement, adults sampled, and juveniles sampled. Results are shown for three levels of escapement (panels) and for a variety of adult and juvenile salmon and steelhead sample sizes (x and y axes). Contour bands show areas of similar CV (coefficient of variation). For an escapement of 1,000 (top graph), dashed line indicates that the total number of adults samples cannot exceed total escapement.

Carlo simulation, researchers will estimate the range and mean of possible increases in smolt production for all reaches combined (Manly 2006). Similar to what was reported in (PacifiCorp 2016), the mean and standard deviation of salmon or steelhead for each restoration technique will be used to create a distribution of project effectiveness values as inputs to the model. Researchers will then run a Monte Carlo simulation with 10,000 model runs to estimate the distribution of possible outcomes for each restoration technique. The results for each technique will then be multiplied by the total length or area to be restored for all reaches combined. The results for each habitat restoration type and reach will combined to calculate the range of possible increases in salmon and steelhead smolts.

2.0 Data Management, Analysis, and Reporting

2.1 Data management

Many programs for monitoring the effectiveness of large restoration programs have failed because of poor implementation, including poor information on location of projects and improper management and reporting of data. Thus, a crucial component of this monitoring program will be data management, analysis and reporting. First, all data will be collected on tablets (iPad or similar) and electronic field forms that prevent data entry errors. The quality assurance and quality control (QA/QC) procedures will be built into the data forms with limited value selection (e.g., select from a list of values), value checks (e.g., values must be an integer), and missing data highlighted to flag any unusual or missing entries. Thus, before leaving the field, the field crew can assure there are no errors and do a final QA/QC. The data will be uploaded into a SQL database for storage and analysis.

2.2 Data analysis

Data analysis for implementation monitoring of all project types will be simply reporting deviations from proposed design in tabular and graphical format. Analysis of physical effectiveness monitoring of floodplain and LW projects will be done with a mixed-effects BACI model (Underwood 1992; Downes et al. 2002; Schwarz 2015). The mixed-effects model (at type of general linear model or GLM) is considered the most robust method for analyzing data collected using a BACI and BA design (Downes et al. 2002; Schwarz 2015). EPT validation monitoring data on fish use for floodplain and LW projects will be analyzed with a combination of paired t-tests and correlation analyses. The paired t-test provides a robust analysis of the average response across all projects, while the correlation analysis will allow examining why some projects produced larger (or smaller) responses than others (Roni et al. 2013, 2018). BA designs used for riparian planting and road removal will be analyzed using trend analysis and t-tests. If assumptions of normality cannot be met, researchers will use non-parametric equivalents (Kruskal-Wallis test). Population level monitoring of smolts, effective breeders, and smolts per breeder and spawner will be analyzed using t-test or GLM and trend-based analysis. Assuming there is adequate years of before and after data, stock-recruitment curves (Beverton-Holt) can also be fitted to the data and compared before and after restoration.

Prior to analysis, all data will be examined for quality and consistency including outliers, normality, and applicability of parametric statistics (Zar 2010; Zuur et al. 2010). Box and whisker plots, as well as kernel density estimation plots (i.e., Rain cloud plots, Allen et al. 2019) will be examined for all variables to detect univariate outliers. Isolation-based anomaly detection (Isolation forests, Liu et al. 2012), will be used to assess multivariate anomalies that may not be extreme values in any one parameter. Researchers will verify that these extreme values and other potential anomalies are not erroneous, and are truly novel outliers. Finally, researchers will assess model fits to see if certain points have undo leverage on the model behavior (E.g. Cook's Distance, cross validation). The Utilities will report a 0.05 and 0.10 level of significance for all statistical tests as well as 95% confidence intervals where appropriate.

EDT estimates of adult production before and after restoration based on detailed habitat data will be compared before and after restoration, and with original estimates from Malone (2020) using simple graphs and tables. Using methods of Roni et al. (2010) and Beechie et al. (2015), Monte Carlo simulations will be run on estimates of on actual restored habitat area and published valued on restoration effectiveness to estimate the range of increase in smolts provided by In Lieu Program. These numbers will also be compared to the reach-scale fish monitoring to confirm whether the restoration is leading to the expected increases reported in published studies evaluating restoration effectiveness.

2.3 Reporting

It will be important for the monitoring team to report on progress annually to keep the Utilities, Program Administrator, and ACC up to date, and to adaptively manage both the monitoring and, more importantly, the Merwin In Lieu Program. Therefore, standard scientific reports with the following sections will be provided by May 31 of each year:

1. Executive summary
2. Background
3. Methods
4. Results
5. Discussion
6. Adaptive management recommendations

7. References

The results, as noted above, will be presented annually to the ACC. This will help ensure the Merwin In Lieu Program focuses on key questions and parameters and will help ensure the project stays on track and provides critical information to adaptively manage the restoration program.

3.0 Expected Outcomes, Potential Challenges, and Next Steps

3.1 Expected Outcomes

Based on results of other monitoring programs evaluating restoration effectiveness, we expect pool area and quality (e.g., residual pool depth, woody cover), and morphology (MQI) to increase significantly three to five years after LW placement. Similarly, we expect to see increases in pool area, residual pool depth, MQI, side channel number, area, connectivity, and total wetted area and area of floodplain inundated at bankfull flows following restoration. EPT monitoring of LW and floodplain projects should also show higher levels of juvenile salmonids in restored reaches three to five years after restoration. Monitoring road removal projects will be more protracted, but we would expect residual pool depth to increase and scour, percent fine sediment, fine sediment infiltration, to decrease 5 to 10 years after restoration. Riparian monitoring results should show growth and survival of plantings following restoration consistent with regional rates for natural vegetation as sites with similar elevation, precipitation, and aspect. The results of reach-scale physical project effectiveness monitoring for LW and floodplain projects should be available three to five years after the implementation of the first projects. These results should allow for adaptive management of later projects implemented as part of the In Lieu Habitat Restoration Plan and program. The population level monitoring will be on a longer time frame and we do not expect to be able to detect a significant response until five or more years after the In Lieu Program has been completed above Swift Dam.

3.2 Relation to Ongoing Monitoring

Existing efforts to enumerate smolts with the FSC and transport adult salmon in steelhead above Swift Dam will provide important data for monitoring population level response to the In Lieu Program (Table 12).Monitoring outmigrating smolts in the screw trap in the North Fork Lewis River upstream of Swift Reservoir will provide additional information on numbers, timing, and, if genetic samples are collected from some of these fish, number of successful breeders. Redd and spawner surveys can be used to examine differences in fish use before and after restoration in restored reaches (though this will require long-term monitoring before and after restoration [10 or more years]), and that restoration occurs in areas used for spawning.

Table 12. Summary of existing smolt and adult salmon, steelhead, and bull trout monitoring in the North Fork Lewis River Basin that are relevant to evaluating restoration effectiveness.

Monitoring	Dates	Description and Metrics
Screw Trap	March - June	Annual monitoring of smolts and juvenile salmonid outmigrants in the North Fork Lewis River above Swift Reservoir. (Screw trap is located in river at head of reservoir). Metrics – juvenile abundance, productivity, and diversity (e.g., variation in age structure, life stage, migration timing, genetic characteristics, etc.).
Swift Floating Surface Collector	October - July	Counting number and time of downstream migrating juvenile (fry, parr, smolts) and adult salmonids at Swift Dam. Metrics – juvenile abundance, productivity, and diversity (e.g., variation in age structure, life stage, migration timing, genetic characteristics, etc.).
Adult fish count arriving at Merwin Dam	Year round	Daily counting of adult bull trout, Chinook, coho, sea-run cutthroat trout, and steelhead. Metrics – adult abundance, productivity, and diversity (e.g., , variation in age structure, sex ratio, run timing, stock composition, and ocean survival).
Spawning ground surveys	Sept. – Dec. (Chinook and coho), March - June (steelhead)	Counting redds, carcasses and spawning adult coho and Chinook salmon and steelhead in tributaries to Swift Reservoir[1]. Steelhead redd surveys are combined with radio tracking to determine steelhead spawner distribution and timing. Metrics – spawner success, redd density and distribution, spatial structure and spawn timing diversity.
Bull trout redd surveys	Sept. - November	Bull trout redd and spawner counts in Pine Creek (mainstem, P8 and P10), Rush Creek, and Cougar Creek. Metrics – spawner abundance, redd density and distribution, spatial structure and spawn timing diversity.
Bull trout effective population size monitoring	July	Electrofishing in select reaches of Pine, Rush, and Cougar creeks to collect tissue samples. All juvenile salmonids are measured and enumerated. Metrics – juvenile abundance, spatial structure, and effective population size (from tissue samples and genetic analysis)

3.3 Potential Challenges

Most of the challenges for the monitoring program are related to the population level monitoring and the need for minor modification of the current smolt and adult monitoring. These include accurate separation and enumeration of parr and smolts at the FSC, additional spawner surveys, genetic samples from adults and juveniles, and identification of suitable reference populations. First, the efficiency of the FSC at collecting and enumerating smolts has been steadily improving, but still below target levels of 95%. The FSC segregates fish collected into three

[1] Spawner surveys are conducted on a rotating three year panel with a third of streams surveyed each year. Thus spawner surveys are not conducted on all streams every year.

tanks (fry/parr, smolts, and adults) based on size class (60 to 120 mm, 121 mm to 220 mm, and greater than 220 mm) and it is likely that some of fish in fry tank are actually smolts or pre-smolts (parr that will smolt shortly). Moreover, since fish generally do not exit Swift Reservoir other than through the FSC except in rare spill events, there are some very large 2+ coho and potentially 2+ Chinook smolts. Therefore, additional sampling and analysis will be needed to accurately enumerate the number of smolts in recent years (2013 to 2019), and address differences in collection efficiency among years to ensure total smolt numbers are accurate. Improvements at the Eagle Cliff smolt trap are also being examined to improve the quality of the data and estimates of fish entering the reservoir. Another minor challenge is that current spawner surveys are done with a three year rotating panel, and data on whether spawners regularly use areas planned for restoration may be limited. This can be addressed by ensuring that annual spawner surveys occur in those streams where restoration occurs. This should be a relatively minor addition to the current spawners surveys assuming that areas where restoration occurs are accessible during spawning season.

Genetic sampling for parentage and kinship analysis will require collecting material (fin clips or tissue) from both adults transported upstream and juveniles collected at the FSC and possibly the Eagle Cliff smolt trap. Genetic samples are currently collected from a subset of adult steelhead transported upstream to look at introgression with resident rainbows, but samples need to be collected from adult Chinook and coho. This is attainable given all adult fish passed upstream of Swift Dam are handled. Collection of samples from juveniles may require some minor modifications of current protocol at the FSC to ensure a representative portion of the fish are sampled. However, a subsample of all fish are already measured to get length information, and tissue samples can be collected from these fish. As noted previously, steelhead pose an additional challenge because of their complex life history and additional samples of fry or parr from the spawning grounds may be needed.

Finally, broad-scale changes in climate, ocean survival, or other factors may influence the number of returning adults and result in either larger than expected or lower than expected adult returns. Low numbers of adult returns or fish released above Swift Dam could complicate detection of trends or changes in population levels due to restoration. In part, focusing on the number of successful breeder and smolts per breeder (reproductive success and survival) will account for this. However, we could see higher smolts per breeder at low population levels due to density dependence rather than a response to restoration. This can be partially but not completely addressed by using data on smolts and adults from reference populations defined in the Aquatic Monitoring and Evaluation Plan. Rerunning EDT in restored stream reaches before and after restoration is designed to serve as backup if population level monitoring is unable to detect a change or requires monitoring many years beyond the In Lieu Program to detect a response to restoration.

3.4 Next Steps

As noted previously, once the Merwin In Lieu Habitat Restoration Plan has been completed and the specific reaches and restoration actions identified, the key aspects of this monitoring plan need to be finalized. This includes confirming potential treatment and control areas, refining field methods depending upon the total length of stream to be restored, developing a specific schedule for collection of pre- and post-restoration data collection, and developing a detailed budget for the monitoring. Treatment and control areas should initially be identified during initial site visits for conceptual designs and finalization of the Habitat Restoration Plan. The other activities would all be defined within 3 to 6 months of completion of the In Lieu Habitat Restoration Plan. Collection of genetic material (fin clips, slime) from adults released upstream of Swift Dam and smolt captured in the FSC should begin as soon as possible so that at least three years of baseline pre-project data can be collected before on the ground habitat restoration begins occurring. There are also some rapidly developing technologies such as environmental DNA (eDNA) and remote sensing mapping methods (e.g., radar, fluid lensing) that are not currently useful for implementation and effectiveness monitoring, but may be perfected in the next few years. Accordingly, these technologies should be re-examined as the monitoring plan is being finalized to see if they have advanced enough to be useful for monitoring restoration effectiveness.

3.5 Preparers

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Lewis River Bull Trout Passage Plan

June 2020

North Fork Lewis River

Merwin Hydroelectric Project (P-935)
Yale Hydroelectric Project (P-2071)
Swift No. 1 Hydroelectric Project (P-2111)
Swift No. 2 Hydroelectric Project (P-2213)

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I. INTRODUCTION

PacifiCorp and the Public Utility District No. 1 of Cowlitz County ("Cowlitz PUD", together with PacifiCorp, the "Utilities") own and operate the four Lewis River Hydroelectric Projects (the "Projects") located on the North Fork of the Lewis River in Cowlitz, Clark, and Skamania Counties, Washington. The Federal Energy Regulatory Commission (FERC) licenses the four Projects separately. The Merwin (Project No. 935), Yale (Project No. 2071), and Swift No. 1 (Project No. 2111) Projects are owned and operated by PacifiCorp. The Swift No. 2 Project (Project No. 2213) is owned by Cowlitz PUD and operated in coordination with the other Projects by PacifiCorp.

On June 26, 2008, FERC issued new licenses for the Projects. During the relicensing process, the Utilities entered into a comprehensive settlement agreement with the Services, Tribes and other stakeholders (the "Settlement Agreement"). The Settlement Agreement includes fish passage requirements for each project that were incorporated into the Project licenses as fishway prescriptions under Section 18 of the Federal Power Act. The Settlement Agreement also includes a provision that allows the Utilities to present new information to the Services regarding whether the construction of the fish passage facilities is appropriate. In the event that the Services determine, after review of such new information, that fish passage is inappropriate, PacifiCorp is required to create an "In Lieu Fund" to support habitat restoration and the Utilities are required to construct certain facilities for bull trout passage.

The Utilities provided new information regarding the appropriateness of fish passage at the Projects to the Services on June 24, 2016. The Services responded on April 11 and 12, 2019, providing the Utilities with a preliminary determination under Section 4.1.9 of the Settlement Agreement. Specifically, NMFS proposed and USFWS concurred in the following actions:

1) To forego construction of the Merwin Downstream Facility (Section 4.6 of the Settlement Agreement) and the Yale Upstream Facility (Section 4.7);

2) To require PacifiCorp to establish the In Lieu Fund consistent with the requirements of Section 7.6 of the Settlement Agreement; and

3) To defer a decision whether to construct the Yale Downstream Facility (Section 4.5) and the Swift Upstream Facility (Section 4.8) until 2031 and 2035, respectively, so that performance of in lieu habitat restoration could be considered in that future decision.

The Services directed that restoration efforts supported by the In Lieu Fund (the "In Lieu Program") focus on stream reaches upstream of the Swift reservoir that benefit three salmon species listed under the Endangered Species Act (ESA): (coho salmon [*Oncorhynchus kisutch*], winter steelhead [*O. mykiss*], and spring Chinook salmon [*O. tshawytscha*]). The Services identified the following reaches known to support all three species since reintroduction efforts began in 2012:

- Clearwater River (8.37 kilometers [km])
- Clear Creek (22.96 km)
- North Fork of the Lewis River (22.69 km)
- Drift Creek (1.52 km)

In addition, the USFWS, in an April 12, 2019 letter, directed the Utilities to proceed immediately with the development of the following fish passage measures for bull trout (*Salvelinus confluentus*) pursuant to Section 4.10 of the Settlement Agreement:

- Yale Downstream Bull Trout Passage Facility
- Swift Upstream Bull Trout Passage Facility
- Yale Upstream Bull Trout Passage Facility

A determination by the USFWS regarding the Merwin Downstream Bull Trout Passage Facility is not due before 2025. Settlement Agreement Section 4.10.1 states "If, pursuant to Section 4.1.9, PacifiCorp does not build the Merwin Downstream Facility described in Section 4.6, then when USFWS determines that bull trout populations have increased sufficiently in Lake Merwin, but not sooner than the 17th anniversary of the Issuance of the New License for the Merwin Project, PacifiCorp shall construct and provide for the operation of a passage facility similar to the Yale Downstream Bull Trout Facility at Merwin Dam (the "Merwin Downstream Bull Trout Facility")." PacifiCorp is obligated per the Settlement Agreement to take action following the USFWS decision.

The purpose of this plan is to outline the specific steps the Utilities will take to develop and construct bull trout fish passage measures. Upon final approval of this Plan by USFWS and FERC, as appropriate, the Utilities will prepare final engineering designs for each fish passage facility and submit the same to the USFWS and the FERC for approval. After approval, the Utilities will obtain all necessary permits and commence construction of the facilities. Operation of new facilities will follow approved protocols to assure safe passage for bull trout consistent with the Settlement Agreement.

II. PROJECT AREA

Monitoring of bull trout populations in the North Fork Lewis River (Figure 1.0) is a collaborative effort among the Utilities and federal and state resource agencies which has occurred annually since 1989. These monitoring activities occur on the North Fork Lewis River and its tributaries upstream of Merwin Dam commencing at river mile (RM) 19.5 and ending at Lower Falls, a complete anadromous and resident fish barrier at RM 72.5. The North Fork Lewis River upstream of Merwin Dam is influenced by three reservoirs created by hydroelectric facilities; 4,000 surface acre Merwin Reservoir, 3,800 surface acre Yale Reservoir, and the largest and furthest upstream 4,600 surface acre Swift Reservoir. From Lower Falls downstream, the North Fork Lewis is free-flowing for approximately 12 miles until the river reaches the head of Swift Reservoir at RM 60. A map of the Project area is shown in Figure 1.0.

Currently, bull trout inhabit all three hydroelectric project reservoirs on the Lewis River, with only three known spawning locations - Cougar Creek, a tributary to Yale Reservoir, and Pine and Rush Creeks which are located upstream of Swift Reservoir (Dehaan and Adams 2011). Each of these areas contain local populations which are genetically unique. No known spawning tributary or local population exists within Merwin Reservoir. The majority of the bull trout population resides upstream of Swift No. 1 dam, and the population levels decrease as one proceeds downstream.

The Plan addresses activities at three distinct locations - one for downstream activities and two for upstream activities. Downstream bull trout passage activities will take place at the forebay of the Yale Project, located at 34.2. Upstream bull trout passage activities will occur at the Yale Project tailrace and the upstream end of the Swift Bypass Reach, located at RM 34.2 and RM 50.9 respectively.

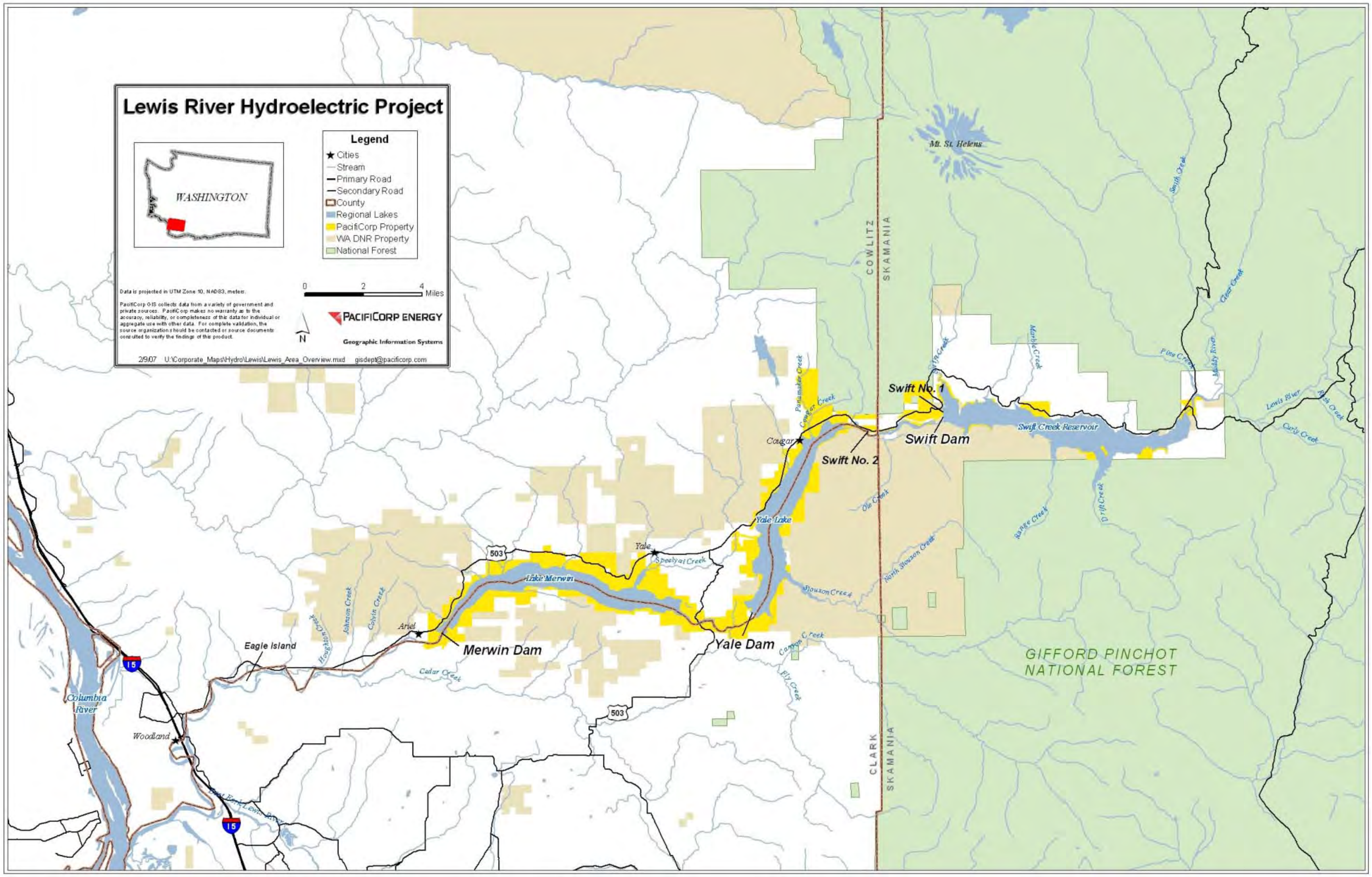

Figure 1. Map of North Fork Lewis River Project Area.

III. SUMMARY OF PREVIOUS BULL TROUT COLLECTIONS

Yale Tailrace

Since 1995, PacifiCorp has annually collected and transported bull trout from the Yale powerhouse tailrace (Merwin Reservoir) to the mouth of Cougar Creek, a Yale Reservoir tributary. A total of 162 bull trout have been captured from the Yale tailrace over this 24-year period. This collection effort occurs annually during the months of May-August. The actual number of collection events have fluctuated during that period from once a week sampling to once a month (Figure 3.0-1).

To capture bull trout from the Yale tailrace, monofilament tangle nets (6.5 cm stretch), trammel nets, beach seines, and angling have all been used. Tangle nets have proven to be the most effective and as such have been utilized for most collection events.

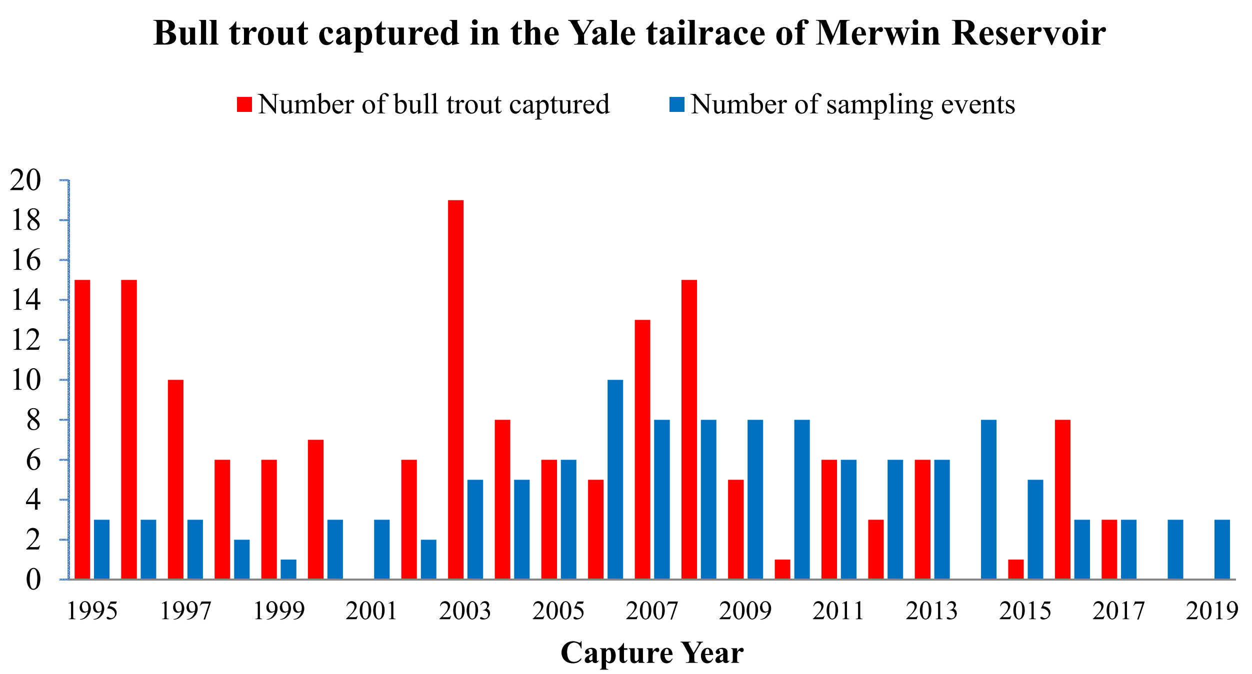

Figure 3.0-1. Historical capture numbers and effort to achieve capture of bull trout within the Yale tailrace 1995-2019

Yale Upper Reservoir and Swift Bypass Reach

Collection activities in the Yale upper reservoir and Swift bypass reach occurred annually from 2007-2016. During that period a total of 209 bull trout were captured. Capture efforts occurred in and around the head of Yale Reservoir and throughout the Swift Bypass Reach between the months of June-August. These events occurred on a weekly or bi-weekly basis (Figure 3.0-2). Review of this collection activity provided compelling data identifying the negative impacts of capture and handling. In 2017, the Lewis River Bull Trout Recovery Team, (a working group comprised of regional biologists/representatives from USFWS, WDFW, USFS, and USGS) who annually review and consult on bull trout monitoring activities in the Lewis River basin, recommended that collection activities in this location be put on hold until the construction of fish passage facilities described in this Plan (Doyle 2016).

Starting in 2011, all collected bull trout were held in tanks at a fish hatchery while rapid response genetic analysis was performed and local population identified. Based on the rapid response genetic results, bull trout were transported and released into either Yale or Swift reservoir (Figure 3.0-2).

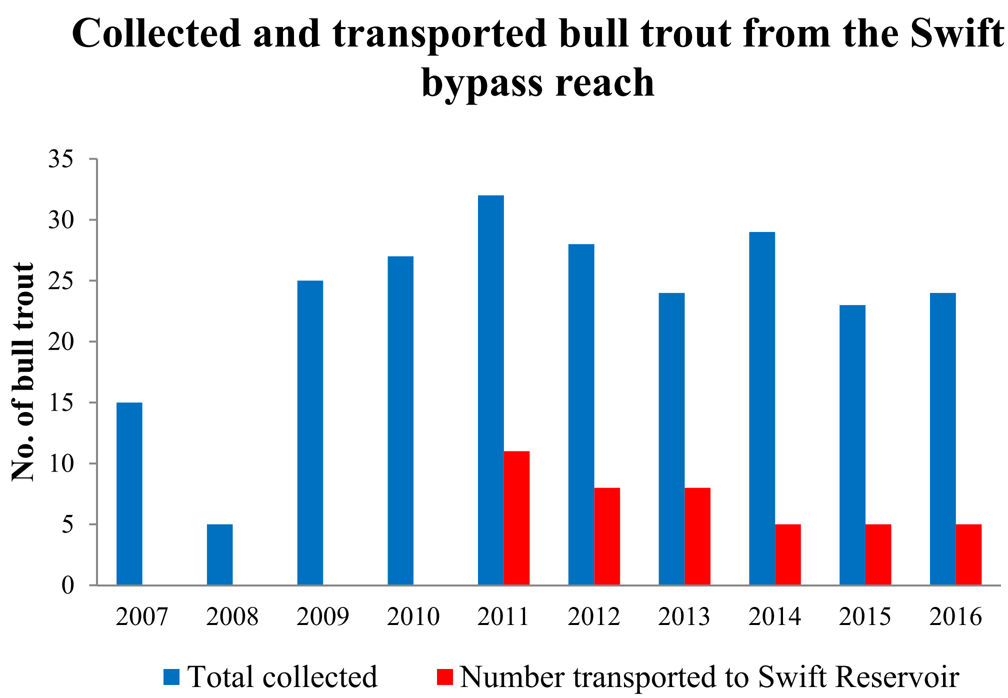

Figure 3.0-2. Historical bull trout capture and transported numbers from within the Swift Bypass Reach 2007-2016.

Swift Lower Reservoir

Little data currently exists concerning juvenile abundance upstream of and within Swift Reservoir. Data concerning migration rates of juvenile bull trout through the reservoir is also sparse and limited to fish encountered at the Swift Floating Surface Collector (FSC). The FSC was put into operation in late 2012. Originally the FSC operated continuously throughout the year; however, since 2015, it operates based on reservoir water quality conditions, typically mid-October through mid-July. Since operation on the FSC began in December of 2012, very few juvenile bull trout have been handled (Figure 3.0-3). During periods of high fish outmigration numbers, with the exception of a daily subsample of fish (subsample percentage dependent on overall collection numbers), all fish that enter the FSC are simply collected into raceways then transferred to trucks for transport downstream to the Woodland Release Ponds, near Woodland, WA. Given this limited evaluation of the fish transported to the release ponds during this time of high congregation of out-migrants, it is likely that additional bull trout have been collected at the FSC and taken downstream of Merwin Dam. This situation was anticipated and accepted by the USFWS through its approval of the Lewis River Fish Downstream Transportation Plan (2009).

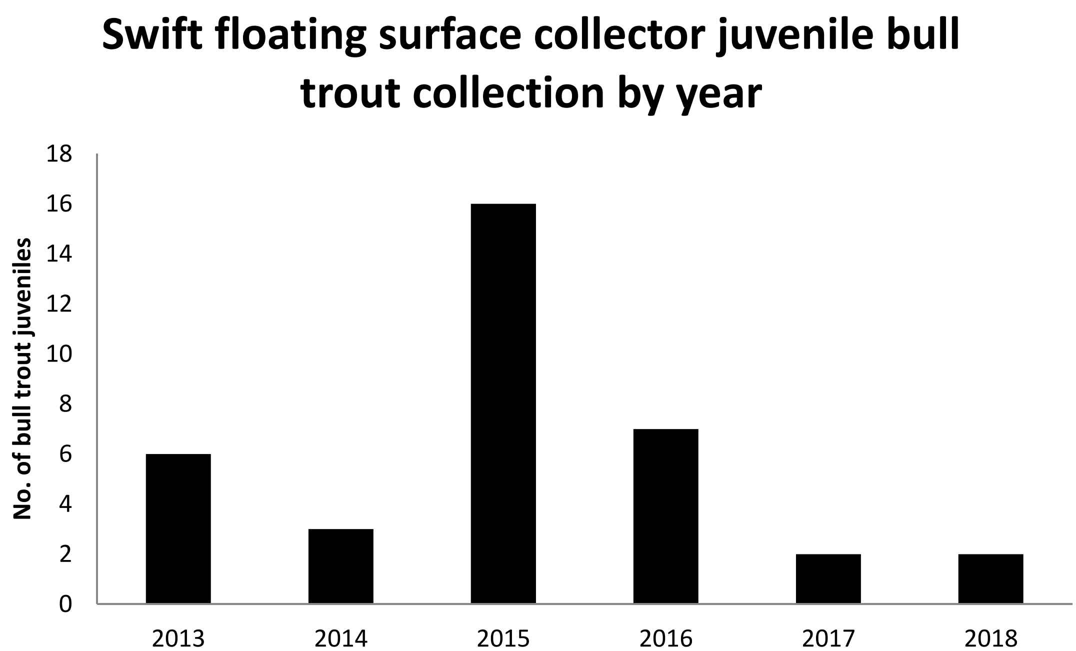

Figure 3.0-3. Annual handled juvenile bull trout at the Swift Floating Surface Collector 2013-2018.

Yale downstream

Of the three local bull trout populations residing within the Lewis River Core Area, only one is found within Yale Reservoir, primarily inhabiting Cougar Creek. This population is small, with annual redd counts ranging from 12-29 redds. No juvenile bull trout data concerning abundance or migration rates through the reservoir for this local population currently exists, but it is expected that the abundance and migration rate is small.

Merwin downstream

Numerous presence/absence and habitat surveys conducted on tributaries to Merwin Reservoir since 1996 have observed no bull trout juveniles and no suitable bull trout spawning habitat. Seasonal water temperature monitoring (May-November) of all tributaries to Merwin Reservoir occurred in 2006 as well as in 2016. Deployed in-situ water temperature thermographs recorded hourly temperature measurements for all sites during both years of study. Only one small 4th Order stream was found to have water temperatures suitable to initiate spawning during the bull trout spawn timeframe (September-October). Unfortunately, this stream is surface-water driven and is intermittent for the majority of late summer/early fall. Kokanee (*Oncorhynchus nerka*) have similar thermal requirements (albeit a bit less stringent) and spawn during the same timeframe as bull trout, and although kokanee inhabit Merwin Reservoir in abundance, no natural kokanee spawning has ever been observed in any tributary to Merwin Reservoir.

Total catch metrics and period of collection for collection sites at the Yale Tailrace, Swift Bypass Reach, and the Swift Floating Surface Collector can also be found in the table below (Table 3.0).

Table 3.0. Capture and handling metrics for period of collection at each respective collection site.

Activity	Date Range	Total Fish Collected over Period	Average # of Collection Events per Year	Range # of Fish Collected per Year	Average # of Fish Collected per Year	Total Capture Mortalities	Total Hatchery Held Mortalities	Cumulative Total Mortalities	Average Mortalities per Year
Yale Tailrace Netting (Adults) (Merwin Res.)	**1995 - 2018**	**162**	**5**	**0-19**	**7**	**4**	**9**	**13**	**0.5**
Swift No. 2 Tailrace/Swift Bypass Reach Netting (Adults) (Yale Res.)	**2007 - 2016**	**232**	**7**	**5-32**	**23**	**1**	**3**	**4**	**0.4**
Swift Floating Surface Collector (Juveniles) (Swift Res.)	**2013 - 2018**	**36**	**n/a**	**2-16**	**6**	**2**	**n/a**	**2**	**0.3**

IV. PROPOSED BULL TROUT FISH PASSAGE FACILITIES

The design of the upstream and downstream bull trout passage facilities are described generally in the Settlement Agreement. Section 4.10.1 describes the nature of the downstream facilities as follows:

> *The Yale and Merwin Downstream Bull Trout Facilities shall be similar in magnitude and scale to modular floating Merwin-type collectors and are not intended to be passage facilities of the same magnitude and expense as the Yale Downstream Facility and the Merwin Downstream Facility described in Sections 4.5 and 4.6 (recognizing that monies shall be contributed to the In Lieu Fund described in Section 7 below in lieu of constructing those passage facilities).*

Similarly, Section 4.10.2 describes the upstream facilities:

> *The Yale and Swift Upstream Bull Trout Facilities are not intended to be passage facilities of the same magnitude and expense as the Yale Upstream Facility and the Swift Upstream Facility described in Sections 4.7 and 4.8 (recognizing that monies shall be contributed to*

> *the In Lieu Fund described in Section 7 below in lieu of constructing those passage facilities). PacifiCorp (for Yale) and the Licensees (for Swift No. 2) shall select an alternative passage facility design for the Yale and Swift Upstream Bull Trout Facilities, in Consultation with the ACC and with the approval of USFWS, and PacifiCorp (for Yale) and the Licensees (for Swift No. 2) shall construct and provide for the operation of such passage facilities for the remaining term of the respective New Licenses. The Licensees shall follow the provisions of Sections 4.1 through 4.1.3 as applicable when developing designs for the facilities.*

The bull trout passage facilities described below are consistent with these requirements of the Settlement Agreement.

Merwin Upstream (Yale tailrace)

Location Description

This trap is intended for capturing upstream migrating bull trout from the Merwin Reservoir and is located off the downstream corner of the Yale powerhouse within the tailrace. This location is depicted on Sheet 1 of the conceptual drawings located in Appendix A. The location is at the upstream-most terminus of the Merwin Reservoir that is not directly subject to the turbulence from flow discharged from the draft tubes of the Yale powerhouse.

Design considerations

A number of considerations were taken into account while developing the design for a trap at this location. These include: operating season, the intended life of the facility, the hydraulic conditions, and the type and number of fish expected to be trapped. Additional information regarding this site is included in Appendix B – Technical Memorandum, Criteria for Bull Trout Passage Facilities.

The operating season is anticipated to extend from May through October. However, the trap can be operated year-round with no difference in the operating conditions other than winterizing mechanical systems for cold weather operation. Because tailrace water elevation varies from 230 feet to 240 feet mean sea level the trap must operate over a range of 10 feet to assure the trap will operate within the 5 to 95 percent exceedance levels for any month throughout the year. The facility will be designed for a 50-year life with a focus on durability and ease of operation.

Based on the previous studies and data noted above, only a few bull trout are expected to be captured on any given day; however, a significant number of kokanee may enter the trap. The trap design for fish per day at this location is five adult bull trout, five sub-adult bull trout, 1,000 kokanee, and 10 other trout species. Special consideration is given to managing the potentially large number of kokanee that could be encountered. Provisions at the trap will be made to first discourage kokanee from entering the trap by establishing hydraulic conditions that are difficult for them to overcome while encouraging bull trout to enter. Secondly, the trap hopper will be outfitted with the means to readily return kokanee in the hopper to the tailrace.

The trap will be located at the far downstream end of the powerhouse with egress to the trap across the powerhouse deck adjacent to the tailrace. The gantry crane for the powerhouse uses this space and depending on where it is positioned the deck clearance is limited to eight feet of width. Once beyond this deck the haul route consists of a paved two-lane road.

Alternatives considered

Several trap concepts were considered for this site, with initial consideration of full fish ladder concepts leading to the selected pool and adjustable weir concept. Fish ladders have the advantage of being a relatively fixed structure such as a vertical slot or Denil ladder with few moving parts. A series of ladder pools could lead up to a hopper for removing the fish. However, the 10 feet of operational variation of the tailwater would require at least 10 pools with a total length of 100 feet for a conventional ladder (at 10 percent grade), or 50 feet length of Denil ladder (at 20 percent grade) to provide passage at the low tailwater condition. The high tailwater condition would flood out most of the ladder resulting in a significantly different passage condition. Flow in a ladder type trap would tend to be a fixed flow between 15 and 25 cubic feet per second (cfs) depending on the configuration of the ladder. Once built the ladder would be relatively in-flexible with respect to varying the hydraulic conditions in order to better attract bull trout with a secondary goal of excluding kokanee. As a result of these disadvantages, a more flexible pool and adjustable weir concept was selected.

Preferred alternative with conceptual design drawings

The preferred alternative at this location consists of a series of three pools leading to a hopper pool. This alternative is depicted on Sheets 1 through 5 of the conceptual drawings located in Appendix A. The three pools leading to the hopper are 7-feet square with 2-foot wide slots between the pools and the tailwater. Each slot includes a telescoping weir that is capable of being adjusted to achieve 0.5 to 1.5 feet of head drop across the weir over the 95 to 5 percent tailwater exceedance conditions during the bull trout trap operating season and with a flow ranging from 20 to 40 cfs. This tailwater range is 10 feet, from 230 to 240 feet of elevation. The invert of the pools are set such that an Energy Dissipation Factor (EDF) of 4 ft*lbs per sec per cf is not exceeded while operating the trap at the low tailwater condition, with a flow of 40 cfs, and a head across the weirs of 1.5 feet. The flexibility of varying the flow along with the head drop across the weirs is intended to allow the trap hydraulic conditions to be optimized for encouraging the passage of bull trout while discouraging access to kokanee.

Fish that reach the upper pools will pass through an adjustable "V" gate from the upstream most pool, Pool 2, into the Hopper Pool. This gate can be closed such that the upstream panel is flush with the wall of the Hopper Pool to allow the hopper to be raised above the gate. A refuge box fabricated from pickets with a 1-inch clear spacing will be placed in the hopper to protect small fish. When the trap is operating at low tailwater and the head across the weirs is 0.5 feet; the volume in the Hopper Pool is 520 cf. The volume required to hold the design limit of bull trout, other trout species, and kokanee is 108 cf. As the hopper is raised the volume decreases. When the hopper is raised out of the water the hopper will dewater to a volume of 54 cf as water flows out the perforated upper walls. The volume required to transport the design limit of bull trout, trout, and kokanee is 65 cf. The hopper is intended to be raised to a level such that the water level in the hopper is raised 40 inches above the deck to allow bull trout to be netted from the hopper and placed into a tote for transport. See Sheet 5 in Appendix A for a depiction of the raised hopper. After all the bull trout are removed from the hopper, the hopper can be raised to a level to access a slide gate mounted on the bottom of the hopper which leads to an 8-inch diameter hose. The hose directs fish into a "Kokanee Hopper" that is positioned over the tailrace. Fish are flushed into this hopper and the hopper is lowered into the tailrace (see Section V below for description of upstream trapping protocols). A trap door in the bottom of the hopper is released by a float mechanism and the empty hopper is raised back up to the deck to be re-deployed.

Flow is regulated into the trap through baffled diffuser gratings located in the bottom of the Hopper Pool and Pool 2. The grating area is 49 square feet and allows up to 24.5 cfs of flow to be discharged into either pool while maintaining a diffuser velocity at 0.5 feet per second (fps). The flow into each pool is controlled through a 36-inch gate that releases water from a pool that the supply pump discharges into. The supply pump is a 50 horsepower (hp) axial flow pump with a variable speed drive to provide a range of flow from 20 to 40 cfs while establishing a range of heads across the weirs between 0.5 to 1.5 feet. The pump is placed in a sump configured to meet the recommended width, length, and submergence requirements described in the Hydraulic Institute Standard for Pump Intake Design.

The pump sump is fed by two cylindrical screens that comply with NMFS and USFWS criteria (NMFS Anadromous Salmonid Passage Facility Design, 2011 – Sections 11.1 through 11.8). The screens shown are manufactured by Intake Screens Inc. (ISI) which make cylindrical screens that are automatically cleaned by rotating the screens against brushes. The screens are sized to achieve a balanced approach velocity of 0.3 fps while operating at a total flow of 40 cfs. A hoist and track system allows the screens to be pulled up to the deck level for maintenance.

If additional attraction flow is deemed beneficial then the proposed trap configuration can include a pump station on the south side of the facility that would supply diffuser panels in the entrance pool. This addition includes a 7-feet square floor diffuser (49 sf) and two 2.2 feet wide by 17.5 feet high wall diffusers (77 sf) positioned in the entrance pool on either side of the weir gate leading to the next upstream pool. The combined capacity of these diffusers is 100 cfs (maximum accommodated by the proposed layout). The flow to the diffusers would be supplied by a 100 hp axial flow pump rated for 100 cfs and controlled by a variable frequency drive (VFD). The VFD allows the pump to operate over a range of 40 to 100 cfs. This entrance pool flow combined with the upstream trap flow results in a total attraction flow over a range of 60 to 140 cfs. The pump sump would be supplied by two cylindrical screens like those previously described (ISI NMFS compliant fish screens) with dimensions of 48-inches in diameter by 17 feet long. This additional flow may not be needed or may not be beneficial, therefore the trap could be fabricated to readily accept the expanded flow capability later in time. This could be done by fabricating plenums for transferring the flow, providing the baffles and diffuser grating, and bolt on flanges for adding on the expanded pump sump, pump, and screens.

Performance testing of the facility will be conducted during the startup and commissioning phase after construction is substantially complete. The testing will include the operation of the pumps, fish screens, weir gates, and hoists to verify the specified operational performance of the individual trap components. The calibration of the instrumentation will be tested to insure proper feedback on limit switches, equipment proximity transmitters, and water level transmitters. The control system will be tested to verify that equipment and instrumentation is properly integrated with the system controller. Overall trap performance testing will be performed after all the individual systems have been documented to be working as designed. The overall performance testing will include a hydraulic evaluation that develops performance curves for the pumps, the diffuser panels, and the gates relative to measured hydraulic differentials. The tested conditions will be documented in an operator's manual, so the trap operators have a clear understanding of how to vary the pump speed, diffusers, and gate position to achieve the desired head and flow conditions at the trap entrance and between each of the upstream pools. This testing will allow the trap to be tuned to optimize the capture of bull trout while discouraging the entry of kokanee.

Upon implementation of Section 4.10 of the Lewis River Settlement Agreement, the Utilities will provide for monitoring of performance as provided in Section 9 of the agreement, and make necessary and appropriate Facility Adjustments and Facility Modifications in consultation with the ACC and approval of USFWS to the new facilities pursuant to sections 4.1.4 and 4.1.6 provided that such modifications shall not require installation of a different type of passage facility.

Yale Upstream (Swift Bypass Reach Upper Release Point)

Location description

This trap is intended for upstream migrating bull trout from the Yale Reservoir and is located at the Upper Release Point within the Swift Bypass Reach. This location is depicted on Sheet 6 of the conceptual drawings located in Appendix A. The location is at the upstream-most end of the waterway that fish can access in the Yale Reservoir.

Design considerations

Design considerations for a trap at this location include; the intended life of the facility, exposure to spill events, the hydraulic conditions, the type and number of fish expected to be trapped, and transport of trapped fish. Additional information regarding this site is included in Appendix B.

The anticipated operating season extends from May through October and has little impact on the trap other than reducing the risk of exposing the trap to spill events that are more likely to occur in the late fall, winter and early spring. Year-round operation would result in the need to remove components of the trap prior to spill events in excess of 5,000 cfs to avoid damage and facilitate possible bedload removal. This level of spill typically occurs about once every two years and the spill event can be anticipated several days in advance.

The trap is designed to have an effective life of 10 years. After 10 years, a review of the trap facility condition will be conducted to determine if maintenance or replacement of it is required.

The hydraulic conditions at the trap are relatively constant for the 95 to 5 percent exceedance flow conditions. These constant conditions are a result of the flow at this location being regulated through a gate operated to maintain a steady flow based on a set point from a flowmeter in the piping leading from the Swift No. 1 tailrace. This facility supplies most of the water to the Swift

Bypass Reach that leads into Yale Reservoir. The facility is designed to operate between 50 and 100 cfs. The design flow used for the trap is 76 cfs. The water surface elevation at this site is based on a hydraulic control in the engineered river channel just downstream of the flow supply facility and will remain steady since the flow is held steady.

Only a few bull trout are expected to be captured on any given day; however, a significant number of kokanee may enter the trap, although much fewer than what is expected at the Merwin Upstream Trap. The design of fish per day at this location is five adult bull trout, five sub-adult bull trout, 200 kokanee, and 10 trout.

The trap will be located to the west of the Swift powerhouse. Vehicle access to the trap will be from the gravel road on the riverside of the Swift Canal. Access to the road and then onto trap site is near the Swift Canal Bridge.

Alternatives considered

A fish ladder concept was considered as an alternative to the selected picket barrier trap at this location. A ladder could be used to lead up to a hopper pool. The hydraulic change is not that great and a few pools could be used to exclude kokanee and provide depth for the hopper pool. Flow from the existing supply structure could be split between the ladder and an entrance pool. The flow associated with the ladder would not be able to vary significantly from the design condition. A ladder results in a relatively permanent structure and when Swift Dam spill events occur it could be inundated and likely impacted with bedload and other sediment which would be difficult to clean out. The picket barrier type trap has been used successfully in similar applications, lends itself to a limited working life, and can be removed from site when damaging spill events are more likely to occur.

Preferred alternative with conceptual design drawings

The preferred alternative at this location consists of a picket barrier leading to a trap with a hopper. This alternative is depicted on sheets 6 through 8 of the conceptual drawings located in Appendix A. The trap uses an existing trapezoidal concrete channel located just downstream of the flow release facility energy dissipation features. The concrete trapezoidal channel is currently filled with bedload that will be excavated.

Two wings of picket barriers will block off the upstream approach and guide fish to an adjustable "V" gate into the hopper. The pickets will consist of 1.25-inch (1.66-inch outside diameter) schedule 40 aluminum pipe spaced 2.66 on center to yield a 1-inch clear opening. The pickets will be oriented at a 45-degree angle and extend 2 feet above the water surface. Picket supports include 4-inch diameter horizontal aluminum pipe. Flow baffle panels will be placed both upstream of the pickets and in the energy dissipation channel to distribute an even flow of 61 cfs through the pickets and 15 cfs through the trap hopper. The panels will consist of a steel plate with 3-inch diameter holes and a porosity of approximately 15 percent. The flow passing through the pickets results in a slot velocity of 1 fps. The flow through the trap hopper results in an entrance velocity of 1.5 fps through the "V" trap entrance. Average velocity through the hopper is 0.6 fps and in the channel downstream of the trap the velocity is 0.5 fps.

Fish will pass through an adjustable "V" gate into the hopper. This gate can be closed such that the upstream panel is flush with the wall of the hopper pool housing. A slide gate in the wall of the hopper allows the hopper to be raised up by the jib crane. When the trap is operating the volume in the hopper is 162 cf. The volume required to hold the design limit of bull trout, trout, and kokanee is 28 cf. A refuge box fabricated from pickets with a 1-inch clear spacing will be in the hopper to protect small fish. As the hopper is raised the volume decreases. When the hopper is raised out of the water the hopper will dewater to a volume of 54 cf as water flows out the perforated upper walls. The volume required to transport the design limit of bull trout, trout, and kokanee is 17 cf. The hopper can be positioned at the upper level by the jib crane to allow bull trout to be netted from the hopper and placed into a tote for transport. Kokanee and trout can be netted out and released back into the pool downstream of the barrier (see Section V below for upstream trapping protocols).

The picket barriers, the hopper, the hopper housing and "V" gate, and flow baffle panels will be anchored to the concrete deck by 6-inch steel pipe posts. The anchorage will include 8-inch pipe sleeves fixed by various components that fit over the post and are pinned in place. The pins will include tethers to allow pulling the pins from the shore. Lifting harnesses will also be included that allow connecting a crane or boom truck to each component without requiring that personnel enter the water. The components include the hopper, the trap box, three baffle panels, and two picket barriers. The heaviest piece is the largest baffle panel which will likely weigh not more than 4000 lbs. The components can be managed by a typical 25-ton boom truck or crane which can pick the deployed components then set them above spill level on a raised pad adjacent to the trap. Site improvements include a concrete block wall to create a raised storage pad near the trap. This configuration will allow all the components to be readily removed and stored at a location up on the bank outside the area that could be inundated during a Swift Dam spill event associated with high river flows.

After a high flow event, the channel will likely need to be excavated. The posts described above will be robust enough to remain in place during a high flow event and any resulting post-event excavation activity. An extreme event that inundates the channel with bedload could result in as much as 400 cubic yards (cy) of bedload that would require removal. A large excavator, such as a 70,000 lb PC300 operating with two dump trucks (10 cy capacity) would likely take about two days to restore the channel. Site improvements include access along the south side of the channel to remove bedload. This type of spill event may last up to a week. A possible scenario could result in shutting down the trap and removing components three days before spill, seven days of spill, two days of bedload removal, and two days of re-installation resulting in a total of two weeks of trap outage. Note that during periods of high spill bull trout are likely to move away from this area and not be entering the trap even if it was available.

Performance testing of the facility will be conducted during the startup and commissioning phase after construction is substantially complete. The testing will include velocity measurements along the downstream face of the picket barriers and at the trap entrance to verify that acceptable velocities along the barrier and that the desired discharge from the trap entrance is achieved. The hydraulic conditions will be documented if modifications are considered for future operation to re-distributing flow through the trap and picket barriers.

Upon implementation of Section 4.10 of the Lewis River Settlement Agreement, the Utilities will provide for monitoring of performance as provided in Section 9 of the agreement, and make necessary and appropriate Facility Adjustments and Facility Modifications in consultation with the ACC and approval of USFWS to the new facilities pursuant to sections 4.1.4 and 4.1.6 provided that such modifications shall not require installation of a different type of passage facility.

Yale Downstream (Yale forebay)

Location description

This trap is intended for downstream migrating bull trout from the Yale Reservoir and is located adjacent to the intake structure for the Yale Powerhouse. This location is depicted on Sheets 9 and 10 of the conceptual drawings located in Appendix A. The location is at the downstream-most location that is accessible to fish in Yale Reservoir.

Design considerations

Design considerations for a trap at this location include; the intended life of the facility, coordination with existing debris boom and exclusion net, the hydraulic conditions, the type and number of fish expected to be trapped, and transport of trapped fish. Additional information regarding this site is included in Appendix B.

The expected operating season extends from March through June, but the trap can be readily operated year-round. The reservoir level typically fluctuates over a 5 to 95 percent exceedance range of 227 to 240 feet. This range of 13 feet has little impact on the operation of the trap other than managing the anchorage to keep the trap within a reasonable location relative to the existing forebay exclusionary net.

The trap is behind the reservoir debris boom and outside the influence of the spillway, therefore flood events are of reduced concern.

Only a few bull trout are expected to be captured on any given day; however, a significant number of kokanee may enter the trap although much fewer than what is expected at the Merwin Upstream Trap.

The trap will be located at the west end of the Yale Reservoir. Access to the trap will require a boat to be launched from the Saddle Dam or Yale Park boat launch. The boat will need to pass through a boat gate in the debris boom to reach the trap located on the upstream side of the intake exclusion net.

Performance testing of the facility will be conducted during the startup and commissioning phase after construction is substantially complete. The testing will include verification that the net geometry is within tolerance of the design configuration, that the panels are flat and that the openings are the correct size and depth. The testing will also include load testing the anchor lines to ensure that the anchor are secure to the design capacity.

Upon implementation of 4.10 of the Lewis River Settlement Agreement, the Utilities will provide for monitoring of performance as provided in Section 9 of the agreement, and make necessary and appropriate Facility Adjustments and Facility Modifications in consultation with the ACC and approval of USFWS to the new facilities pursuant to sections 4.1.4 and 4.1.6 provided that such modifications shall not require installation of a different type of passage facility.

Alternatives considered

Section 4.10.1 of the Lewis River Settlement Agreement calls for a "Merwin" type trap at this location, several trap and net locations were considered during development of the initial drawings, but discounted due to access, safety and concern for any better viability of success.

Preferred alternative with conceptual design drawings

The preferred alternative at this location of a "Merwin" type trap is depicted on Sheets 9 through 11 of the conceptual drawings located in Appendix A. The trap is fabricated out of 0.5 inch nylon mesh. The trap is intended to intercept fish swimming along the exclusion net adjacent to the Yale dam and intake. Fish will be intercepted by a 30-foot deep by 150-foot long section of net called the Lead Net that will be connected to the exclusion net. The intercepted fish will be guided into the Heart of the trap through a 3-foot wide by 12-foot deep "V" type opening. The Lead and Heart nets of the trap are supported by a line of individual floats and weighted by chain at the bottom. Fish then pass into the Pot section of the trap which is a 16-foot square by 17-foot deep net pen. The Pot leads to the 16-foot square by 17-foot deep section of net called the Spiller. The Pot and Spiller are supported by an 18-inch diameter HDPE floating frame. A refuge box fabricated from pickets with a 1-inch clear spacing will be hung in the Pot and Spiller to protect small fish. The 4,400 cf volume of the net pens provide ample holding capacity for all anticipated fish.

The trap will be secured by shore anchors and one lake anchor. Lines of synthetic rope will extend to a floating buoy. The buoy will be connected to the respective anchor with a length of chain.

The sag of the chain will maintain tension on the system and maintain the position of the trap. Fish are retrieved from the trap by pulling up the bottoms of the Pot and Spiller pens from a boat. Any captured bull trout will be placed into totes for transport. All other captured fish species will be placed back into Yale Reservoir (see Section VI below for downstream trapping protocols).

V. UPSTREAM TRAPPING PROTOCOLS

Yale Tailrace

The Yale Tailrace bull trout collection facility will be a permanent structure with pump supplied water attractant as described in Section IV and depicted on Sheets 1 through 5 of the conceptual drawings located in Appendix A. Trapped fish will ultimately end up in a holding pool. The holding pool will include a box made up of pickets to segregate large and small fish. This refuge will have 1-inch clear openings formed by pickets to partition trapped bull trout into two groups to keep fish larger than 450 millimeters (mm) from preying on smaller bull trout.

This facility can be operated year-round with fish collection expected to occur during the adult bull trout migration and spawn timeframe, May-October. The trap can be operated continually 24 hours a day, seven days a week, subject to safety and weather limitations. Given focus of facility is bull trout passage for seasonally migrating fish, it is proposed that the facility be shut down and not operated November-April.

Swift Bypass Reach

The Swift Bypass Reach Upstream Bull Trout Collection Facility will be located at the siphon discharge channel at the terminus of the Swift Bypass Reach (e.g., "Upper Release Point"). The siphon conveys water directly from the Swift Power Canal and is regulated by a gate modulated with an actuator to maintain a flow set point based on a flowmeter signal. The flow is dependent on time of year, ranging from 51-76 cubic feet per second (cfs). This fish collection facility will consist of a picket barrier that leads fish into a hopper type trap. The trap is described in Section IV and depicted on Sheets 6 through 8 of the conceptual drawings located in Appendix A. A box made up of separator bars with 1-inch clear spacing within the tank will prohibit fish greater than 450 mm from accessing part of the holding tank, thus providing a refuge area for smaller bull trout.

This facility can be operated year around with fish collection expected to occur during the adult bull trout migration and spawn timeframe, May-October. The trap can be operated continually 24 hours a day, seven days a week, subject to safety and weather limitations. Given focus of facility is bull trout passage for seasonally migrating fish and concerns with high flow inundation impacts associated with spill from Swift Dam, it is proposed that the facility be shut down and not operated November-April.

Handling Protocols

Each holding pool(s) within an upstream trapping facility will be checked once per day when in operation, or as directed by the USFWS Based upon prior sampling in the Yale Tailrace since 1995 and Swift Bypass since 2007, it is not anticipated that large numbers of bull trout will be encountered at a collection facility on a daily basis (Table 3.0).

All collected bull trout will be scanned for a passive integrated transponder (PIT) tag. If no PIT tag is found (maiden capture), collected bull trout will be tagged with a 23 mm half-duplex PIT tag in the dorsal sinus if >250 mm fork length. If collected bull trout is <250 mm fork length, it will be tagged with a 12 mm full-duplex PIT tag in the same dorsal sinus location. All maiden captured bull trout will be measured to their caudal fork as well as tissue sampled for genetic local population identification, to be analyzed at a later date. It is not anticipated that collected bull trout will be held longer than 24 hours prior to transport.

A data sheet detailing all prior handled bull trout and their associated PIT tag codes as well as associated genetic local population assignment will be available to the biologist monitoring the facilities. If a trap collected bull trout is scanned and found to contain a PIT tag, the code will be compared to the prior handled bull trout PIT tag code sheet and the local population for that fish will be identified. Given that upstream fish collection facilities are at the upstream terminus of a given reservoir area, collected fish will be considered to be exhibiting upstream migrating behavior and will be transported to the next upstream reservoir.

All other collected species will be handled according to species and size of fish. Any kokanee captured will be returned to reservoir of capture. Any coho, spring Chinook, or steelhead captured will be released as follows: Large fish (FL > 320 mm) will be assumed to be migrating upstream and will be transported to Swift Reservoir; small fish (FL < 320 mm) will be transported downstream of Merwin Dam to the Woodland Release Ponds similar to those juveniles collected at the Swift Floating Service Collector.

Transport Protocols

After biological sampling, captured fish may be loaded onto a fish transport truck. Bull trout collected from the Yale Tailrace facility will be transported and released upstream into Yale Reservoir preferably at the Cougar Creek Campground boat launch. If, due to low reservoir levels the Cougar Campground boat launch is unusable, fish will be released at Saddle Dam boat launch. Bull trout collected from the Swift Bypass Reach trap will be transported and released into Swift Reservoir at the Eagle Cliff fish release location. Eagle Cliff is the preferred release location, but if unusable due to low water levels or some other unseen logistical situation, then the Swift Forest Campground boat launch will be utilized. Loading densities will follow protocols as set forth by the Washington Department of Fish and Wildlife (WDFW) and the National Oceanic and Atmospheric Administration (NOAA) fisheries office of one gallon per every pound of fish. It is anticipated given expected trap numbers that a 250-gallon tank fish truck will be adequate to handle the daily catch. If in the future, capture numbers increase and the 250-gallon tank is no longer adequate, then a 1,800 gallon tank fish truck will be utilized. A partition will be built into the tank of the fish truck to accommodate hauling fish of differing sizes. Due to predation concerns, at no time will fish greater than 450 mm fork length be held or transported in a tank with fish less than 450 mm fork length.

The fish transportation trucks are equipped with oxygen tanks providing supplemental oxygen flow through air stones. Oxygen flow will be initiated within the tank prior to fish transfer into tank. Each truck also has a recirculating system to help manage dissolved oxygen levels during transport. Oxygen will be initially set to meter about two liters per minute. Dissolved oxygen is to be checked within fifteen minutes of completion of fish loading into tank, and monitored regularly until fish are released at the designated location. If there is a problem and fish are in distress the driver will increase the oxygen level and return to the departed collection facility or proceed to the release site depending on which is closer. Dead fish should not be released, instead, they should be returned to the collection facility. Per USFWS Biological Opinion (USFWS, 2006), the USFWS will be notified of any bull trout mortalities within 24 hours of initial finding.

Prior to fish release at any site, water temperature will be checked. The receiving water temperature measured 1-foot below the water surface should be less than 18˚C. There should not be more than a 3˚C change from the holding tank water to the receiving water. If there is a greater than 3˚C difference, then the water in the tank should be tempered. If there is a large difference between tank water and receiving water (stream water), tempering may not be able to resolve this issue in a timely manner. Rather than tempering the tank water, the driver will move onto each sites' respective secondary release location.

Once adult fish are released the fish truck driver will record visual observations, documenting the date and time of release, and any unusual release conditions (e.g. water temperature differential, predators in the area, etc.).

Given fish transportation trucks stay within the North Fork Lewis River basin, there is no need to disinfect the truck tanks between trips. At the end of the day, however, and per WDFW recommendation, the transport truck tanks are rinsed with VIRKON disinfectant and virucide.

All trapping, handling, and transport protocols proposed above will be annually open to revision. PacifiCorp will continuously work with the Lewis River Bull Trout Recovery Team to adaptively manage passage decisions and protocols.

VI. DOWNSTREAM TRAPPING PROTOCOLS

Yale Reservoir - Forebay

A Merwin-type net system with trap will be placed in the Yale forebay upstream of the Yale powerhouse intakes. The proposed facility is described in Section IV and depicted on Sheets 9 through 11 of the conceptual drawings located in Appendix A. At the request of the Lewis River Aquatic Coordination Committee, the Utilities have considered other downstream trapping methods, however given direction provided in section 4.10.1 of the Settlement Agreement, expected low collection numbers of downstream migrating bull trout, access and safety concerns, the Utilities support a modular floating Merwin-type collector.

As no mechanism currently exists to measure juvenile bull trout abundance or use of Yale Reservoir, the Swift Floating Surface Collector (FSC) located upstream in Swift Reservoir was utilized for comparison purposes in an attempt to better understand numbers of juvenile fish that could be encountered within each reservoir. The FSC was put into operation in late 2012, and since that time has either run continuously throughout the year, or until recently on a seasonal duration of continual operation from mid-October through June. During that time, and though the bulk of the bull trout population in the basin resides in and upstream of Swift Reservoir, very few juvenile bull trout have been collected (Figure 3.0-3).

Given the anticipated low capture numbers, this facility, while operation year around is possible, is proposed to be operated on a seasonal basis from March-June, during the typical juvenile fish out-migration period. As this is a floating, volitional entry trap, trapping operations will be 24 hours, 7 days per week, subject to safety and weather limitations.

Handling Protocols

During the operating period the holding trap will be checked by boat daily for any captured fish. Captured juvenile bull trout will be biologically sampled (fork length, genetic material, PIT tag if FL >80 mm) and then transported within an oxygenated tank aboard the boat to a waiting fish transport truck where collected fish will be taken down stream and released at the Woodland Release Ponds. Any coho, spring Chinook, or steelhead captured will be released as follows: Large fish (FL > 320 mm) will be transported upstream to Swift Reservoir; small fish (FL ≤ 320 mm) will be transported downstream of Merwin Dam to the Woodland Release Ponds similar to those juveniles collected at the Swift Floating Service Collector. Should steelhead kelts be captured, they also will be transported downstream of Merwin Dam for release at the Woodland Release Ponds. Other incidentally captured fish species including kokanee will be liberated in Yale Reservoir outside of the influence of the trap.

All trapping, handling, and transport protocols proposed above may be revised on an annual basis. PacifiCorp will continuously work with the Lewis River Bull Trout Recovery Team to adaptively manage passage decisions and protocols.

VII. Facility Effectiveness Monitoring

The Merwin Upstream, Yale Downstream, and Yale Upstream bull trout collection facilities will undergo effectiveness monitoring to assess their efficacy at meeting defined performance standard targets described in the USFWS 2006 Biological Opinion (pp. 82-94) and Settlement Agreement Section 4.10 unless subsequent ESA consultations result in different performance standard targets. Effectiveness monitoring will be developed prior to facilities completion and incorporated within the Utilities Bull Trout Annual Operations Plan.

Regarding survival, the USFWS 2006 Biological Opinion stipulates that upstream and downstream passage facilities will be designed to meet 99.5 percent adult bull trout survival and 2 percent injury standards. In the event those standards are not achieved, facility adjustments or modifications will be made as directed by the USFWS pursuant to the Settlement Agreement. USFWS also assumed all upstream passage facilities would attract and capture at least 52 percent of all adult bull trout attempting to migrate upstream to spawn, whereas downstream passage facilities would help to reduce mortality and entrainment into turbines at each of the dams. Further specifics of effectiveness monitoring will be developed with direct input and consultation from the Lewis River Bull Trout Recovery Team.

VIII. Permitting

Prior to construction of bull trout fish passage facilities identified above, the Utilities must obtain federal, state and local permits. Specific permits may include, but are not limited to:

- Section 404 Permit – US Army Corps of Engineers
- In-water Work Protection Plan Approval – Washington Department of Ecology
- Hydraulic Project Approval – Washington Department of Fish and Wildlife
- Shoreline, Critical Areas and Land Use Approvals – Clark County / Skamania County
- Aquatic Land Lease – Washington Department of Natural Resources

The Utilities anticipate that it will take 12 – 18 months to obtain all required permits.

VIV. REFERENCES

Doyle, J. 2016. Lewis River Bull Trout Annual Operating Plan. PacifiCorp. Ariel, Washington.

USFWS. 2006. Biological Opinion for the Lewis River.

APPENDIX A – Drawings

VICINITY PLAN
SCALE: 1" = 60'

60 0 30 60
SCALE: 1"= 60'

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DATE 07/16/2019	
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DR DEP/R2	CH DEP/R2
APPROVAL	

LEWIS RIVER BULL TROUT PASSAGE
MERWIN UPSTREAM @ YALE TAILRACE

VICINITY PLAN

R2 Resource Consultants, Inc.
REDMOND, WA

PACIFICORP HYDRO

SCALE: AS NOTED | SHEET 1 OF 11 | REV.

PLOT SCALE: 1 = 1:1

REFERENCE DRAWINGS | DRAWING No. | REFERENCE DRAWINGS | DRAWING No. | BY | CHK | APP | REVISION | No. | DATE | BY | CHK | APP | REVISION | No. | DATE

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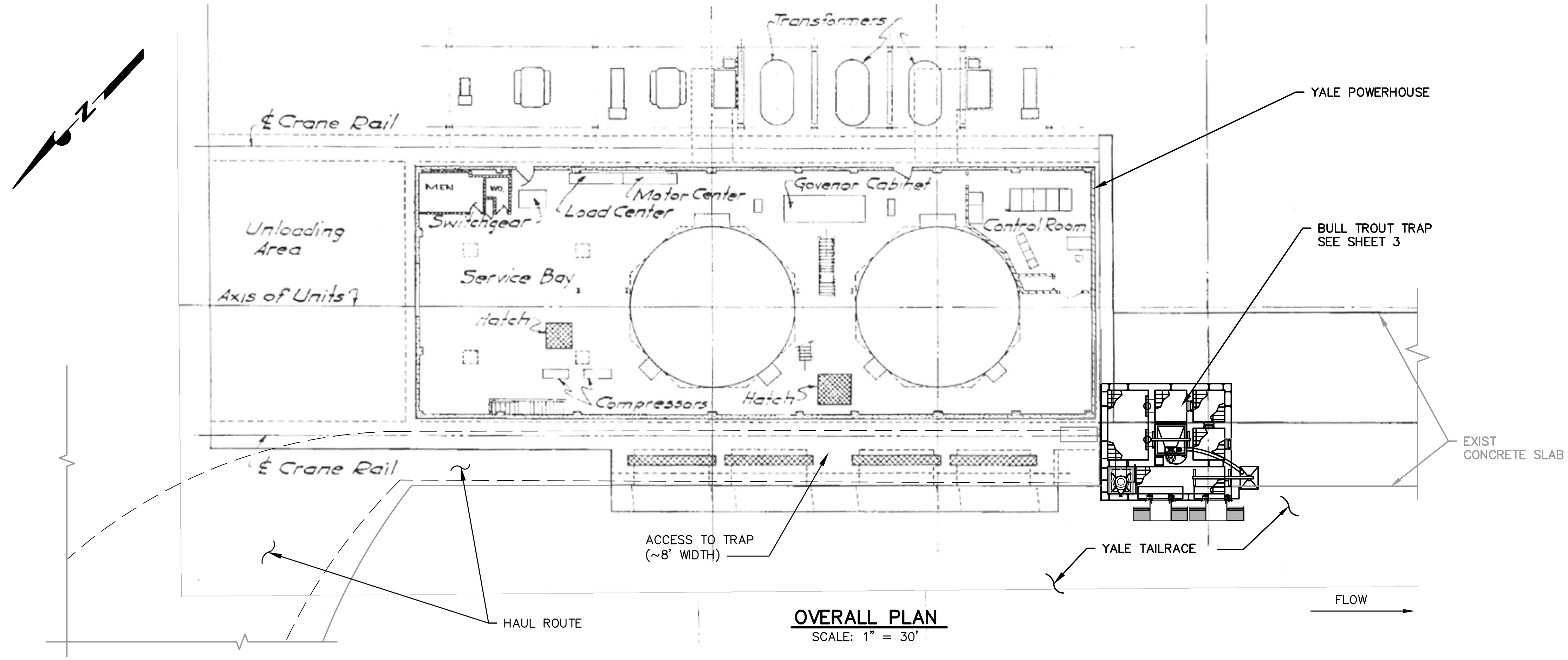
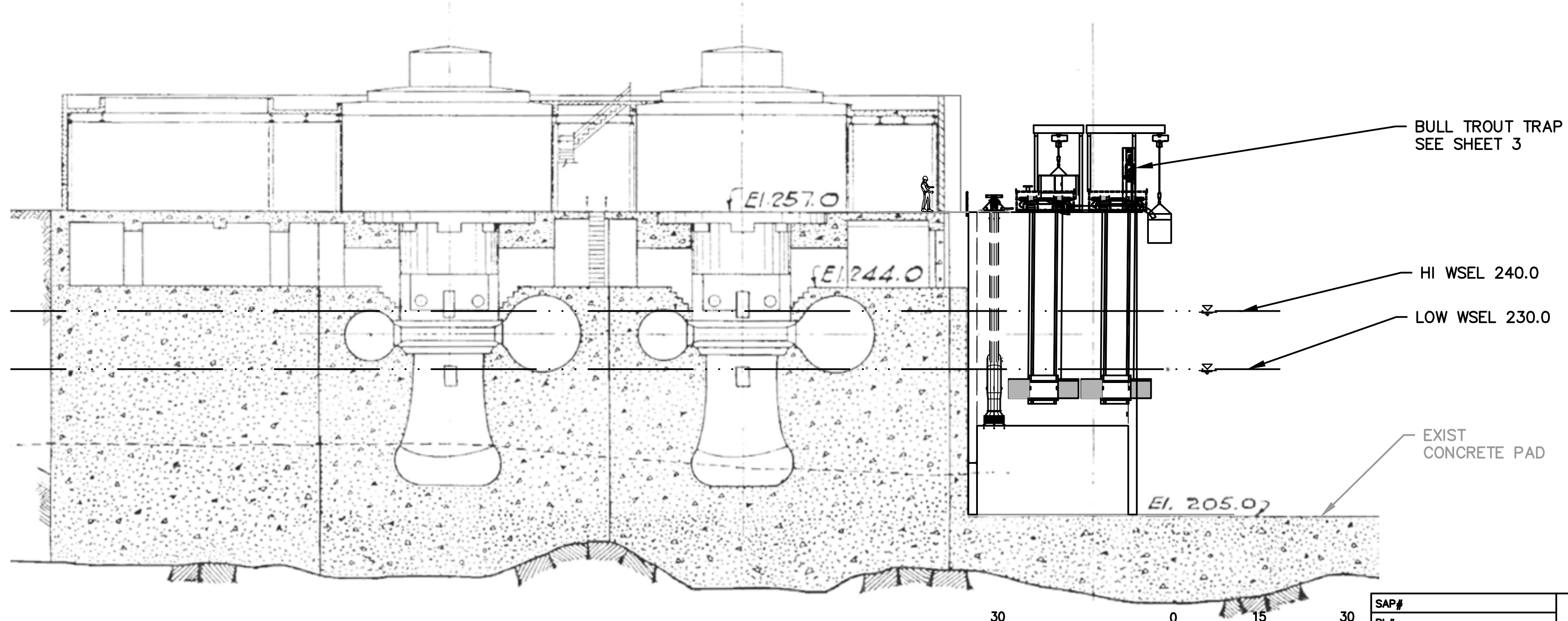


OVERALL PLAN
SCALE: 1" = 30'



OVERALL PROFILE
SCALE: 1" = 30'

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DR DEP/R2	CH DEP/R2
APPROVAL	

LEWIS RIVER BULL TROUT PASSAGE
MERWIN UPSTREAM @ YALE TAILRACE

OVERALL PLAN AND PROFILE

PACIFICORP HYDRO

SCALE: AS NOTED | SHEET 2 OF 11 | REV.

R2 Resource Consultants, Inc.
REDMOND, WA

PLOT SCALE: 1 = 1:1

REFERENCE DRAWINGS | DRAWING No. | REFERENCE DRAWINGS | DRAWING No. | BY | CHK | APP | REVISION | No. | DATE | BY | CHK | APP | REVISION | No. | DATE

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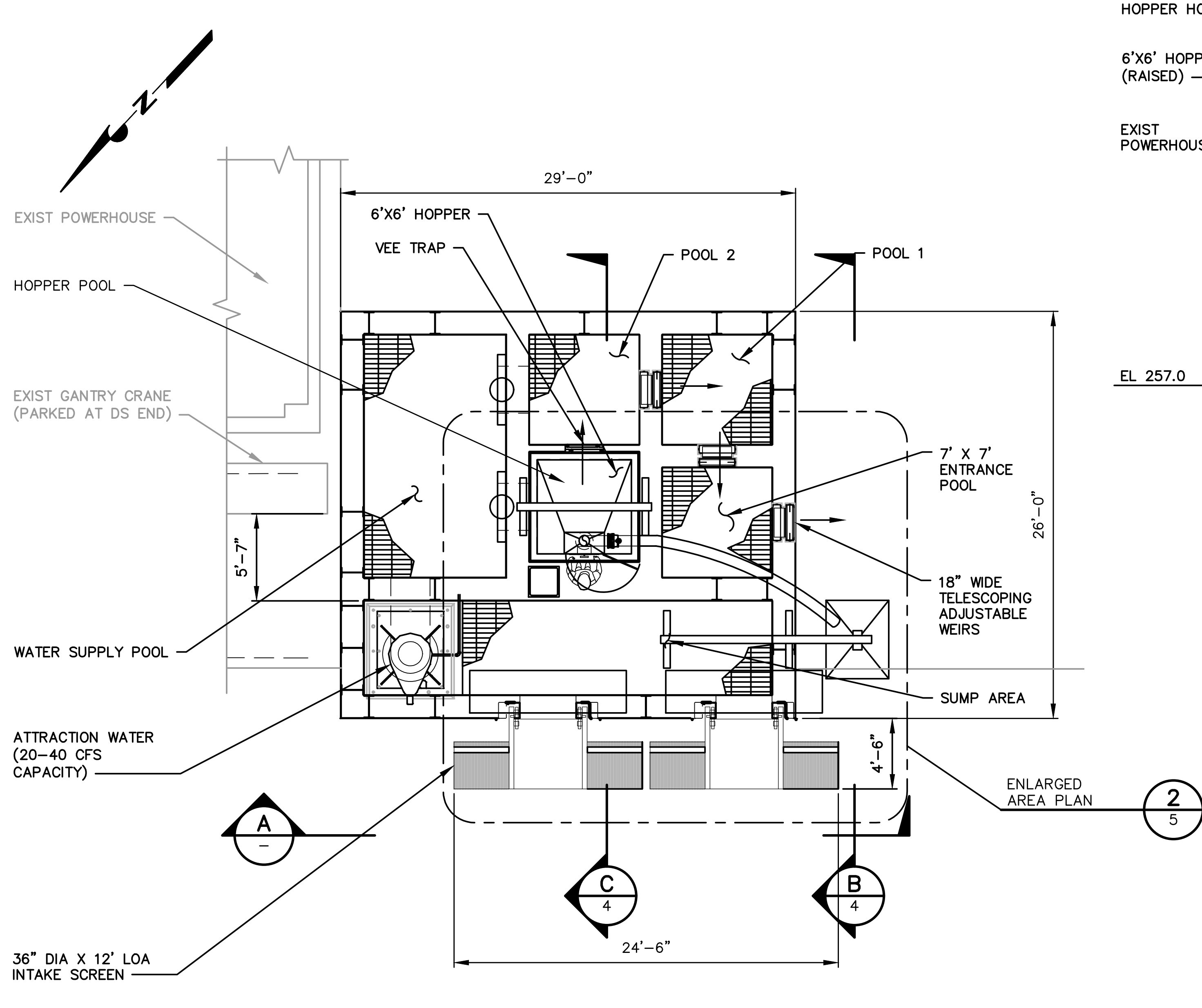
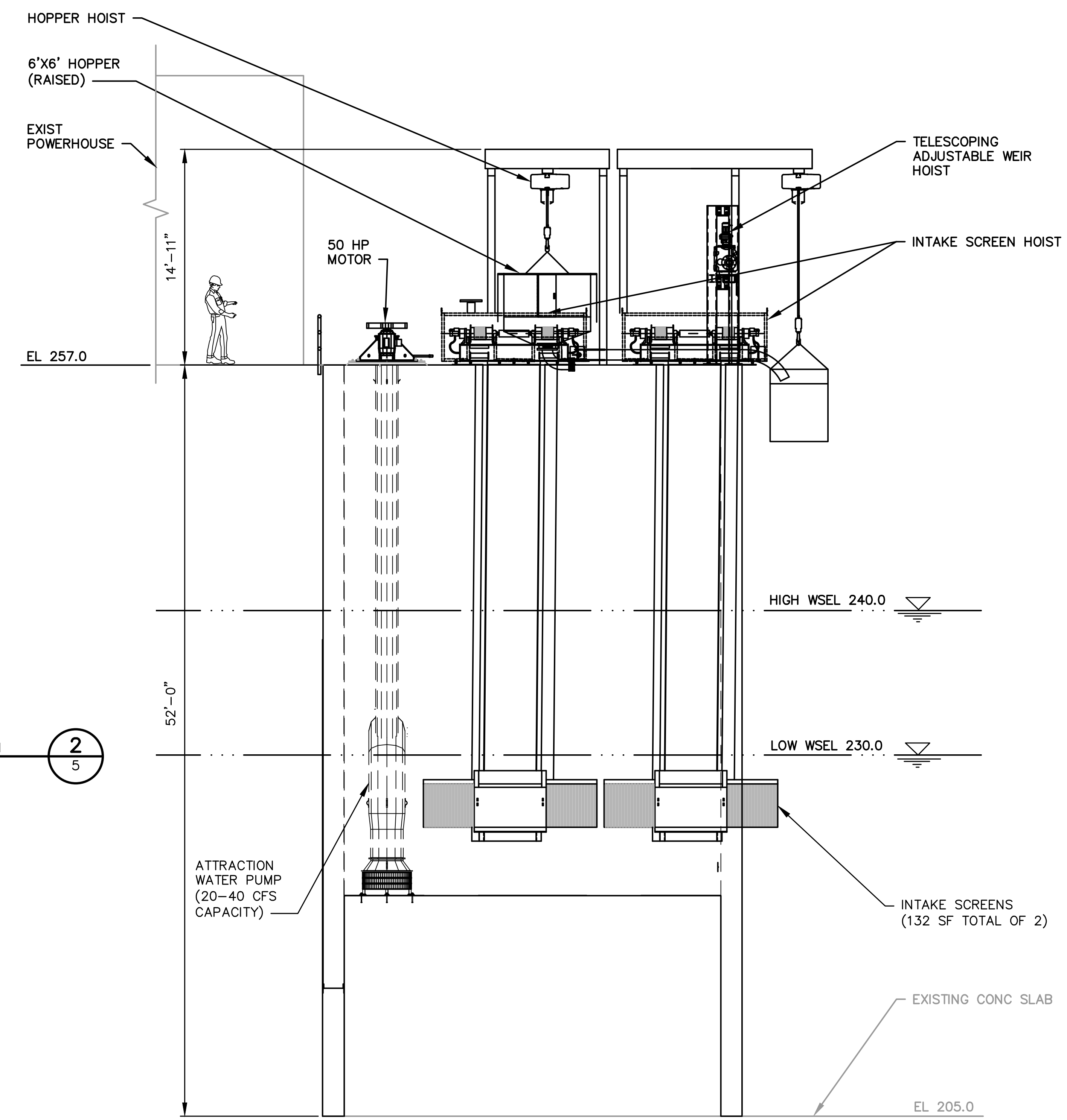


PLAN
SCALE: 1" = 10'

NOTES:

1. SEE SHEET 5 FOR TRAP PERFORMANCE NOTES.



ELEVATION–FRONT
A
–
SCALE: 1" = 10'

10 0 5 10
SCALE: 1"= 10'

Resource Consultants, Inc.
REDMOND, WA

SAP#
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DATE 07/16/2019
ENG FEP/R2 DES FEP/R2
DR DEP/R2 CH DEP/R2
APPROVAL

LEWIS RIVER BULL TROUT PASSAGE
MERWIN UPSTREAM @ YALE TAILRACE

PLAN AND ELEVATION

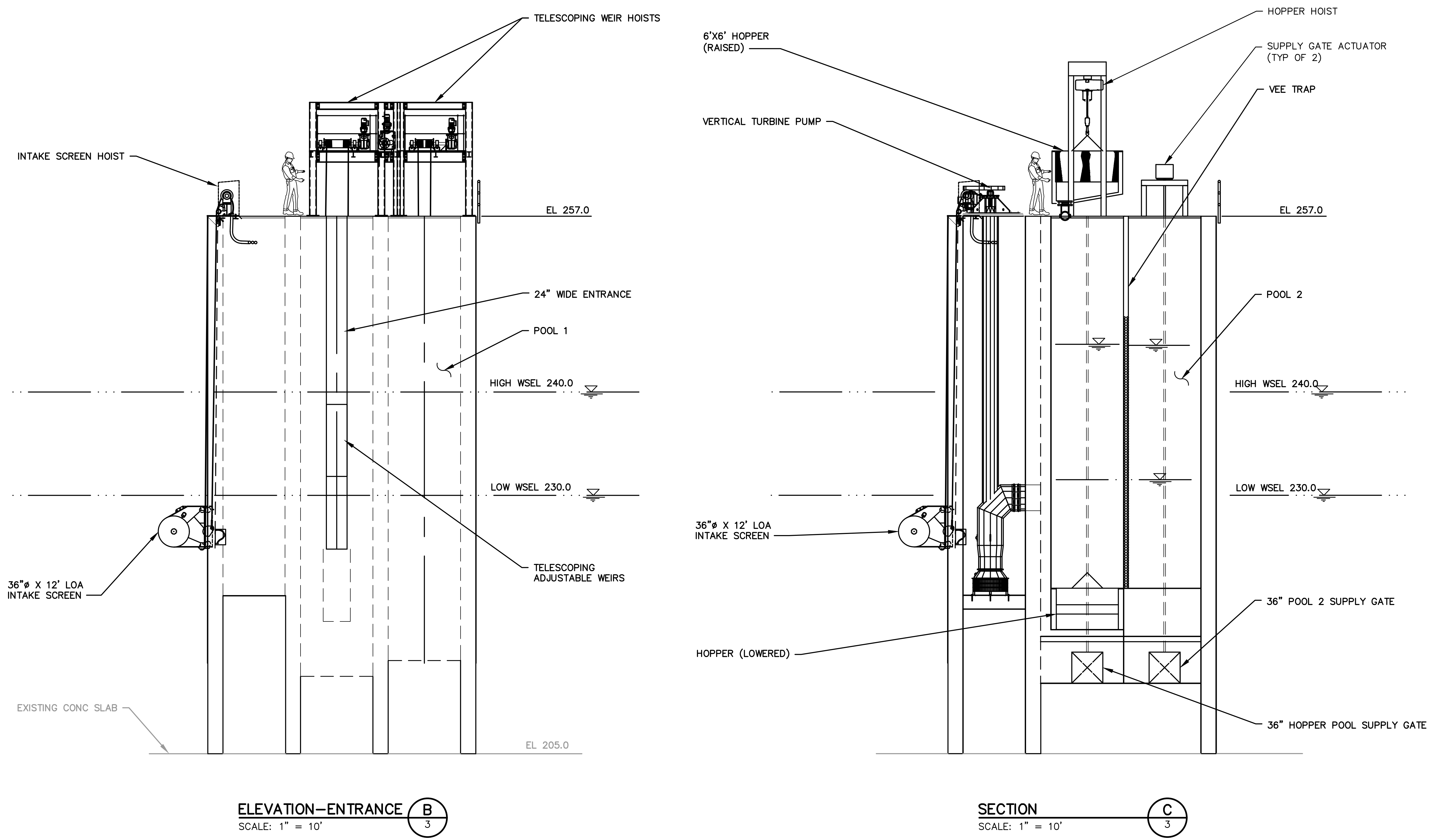
PACIFICORP HYDRO

SCALE: AS NOTED SHEET 3 OF 11 REV.

PLOT SCALE: 1 = 1:1

REFERENCE DRAWINGS	DRAWING No.

REVISION	DATE	No.	BY	CHK	APP



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DR DEP/R2	CH DEP/R2
APPROVAL	

LEWIS RIVER BULL TROUT PASSAGE
MERWIN UPSTREAM @ YALE TAILRACE

ELEVATION AND SECTION

PACIFICORP HYDRO

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REDMOND, WA

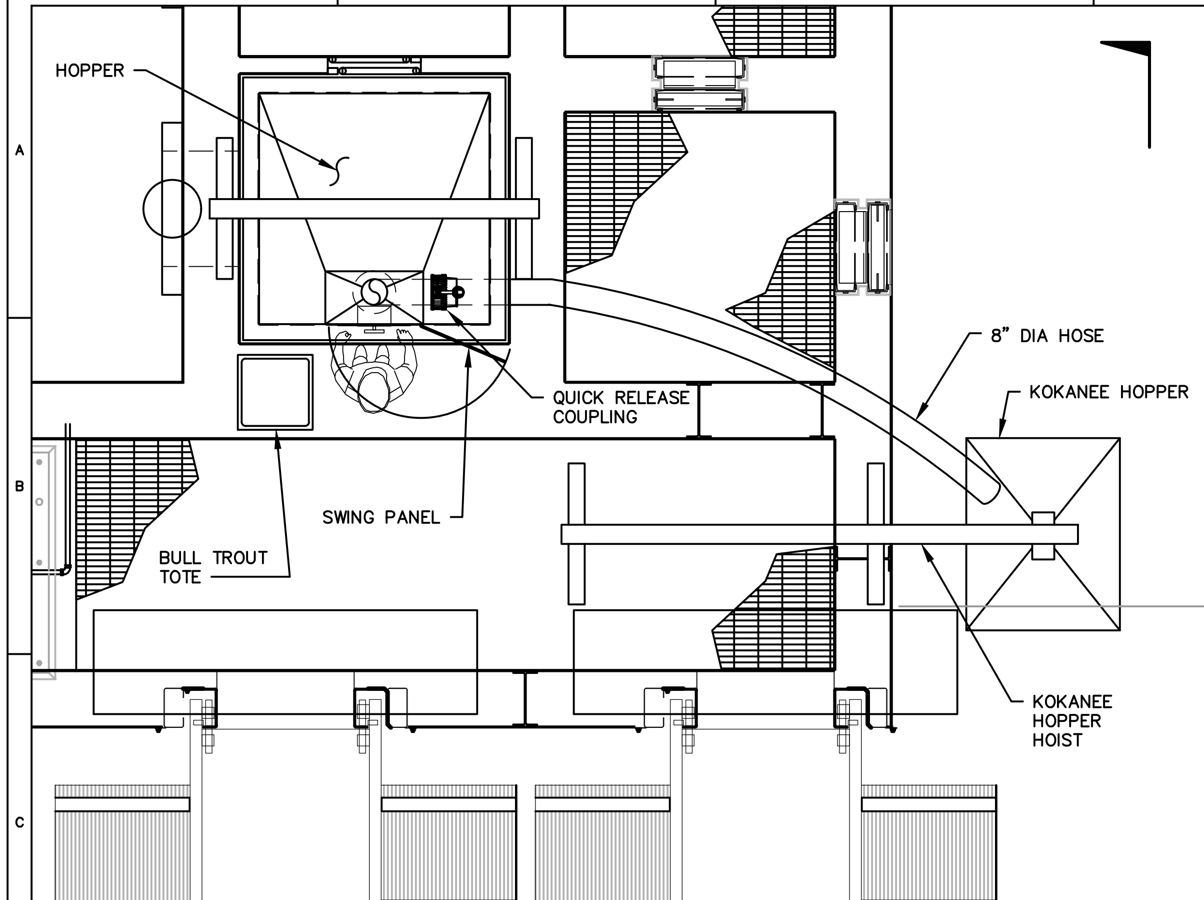
SCALE: AS NOTED | SHEET 4 OF 11 | REV.

PLOT SCALE: 1 = 1:1

REFERENCE DRAWINGS | DRAWING No. | REVISION | BY | CHK | APP | No. | DATE

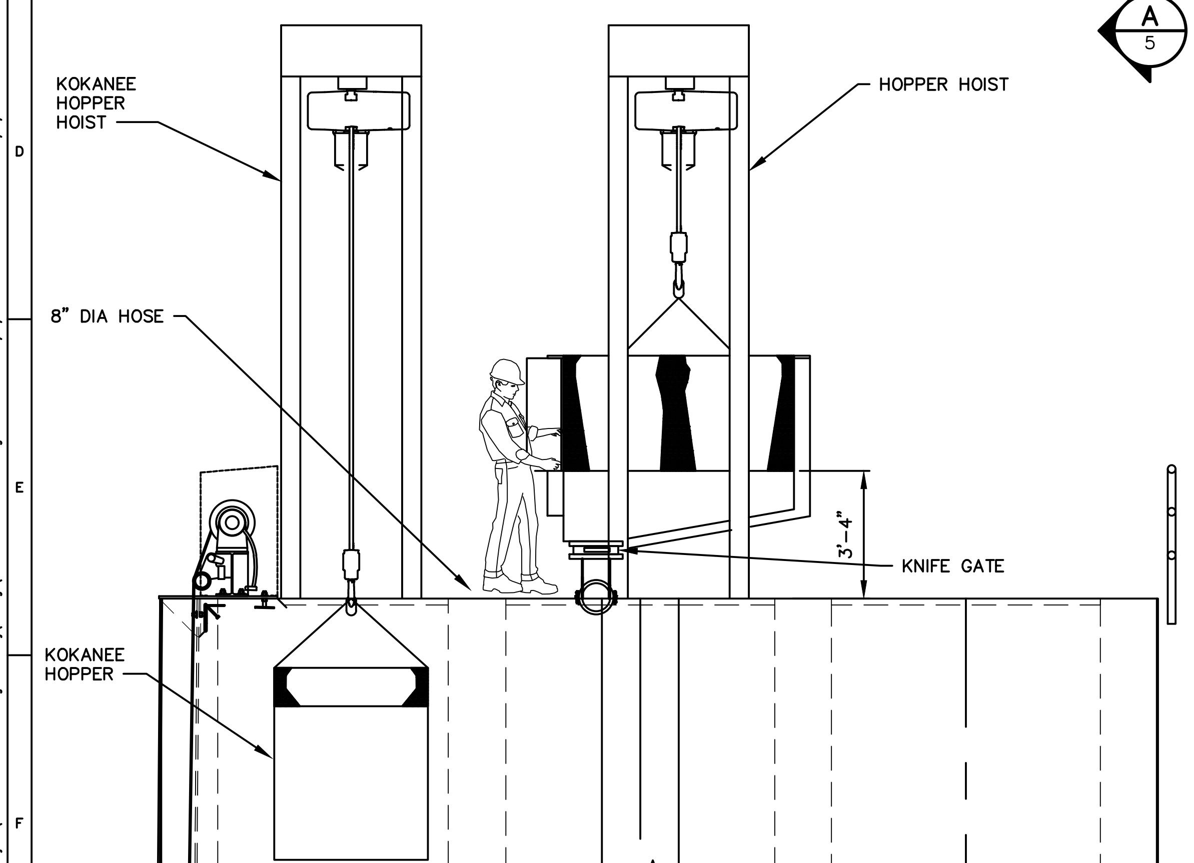
NOTES:

1. TRAP FLOW: 20–40 CFS.
2. OPERATION SEASON: MAY–OCTOBER.
3. HOPPER: 6' X 6' X 4.5' DEEP RESULTING:
   SUBMERGED VOL: 520 CF (520 – 4 LB FISH)
   TRANSPORT VOL: 54 CF (100 – 4 LB FISH)
3. ENTRANCE WEIR (AND WEIRS BETWEEN POOL): 24" WIDE.
4. HYDRAULIC PROFILE DEPICTS THE LIMIT OF OPERATION: 6" HEAD ACROSS WEIRS AT LOW TAILWATER AND 18" OF HEAD ACROSS WEIRS AT HIGH TAIL WATER.
5. WEIR DEPTH @ 40 CFS & 6" HEAD: 4.6' DEPTH @ 6" HEAD
6. WEIR DEPTH @ 40 CFS & 18" HEAD: 2.3' DEPTH @ 18" HEAD
7. POOL DEPTHS SET TO ACHIEVE A ENERGY DISSIPATION FACTOR OF 4 FT*LBS/SEC/CF @ 40 CFS, 18" HEAD AND MIN TAILWATER
8. INTAKE SCREENS COMPLY WITH USFWS AND NMFS CRITERIA. SLOT OPEN – 1.75 MM, AUTOMATIC BRUSH CLEANING, BAFFLED FLOW BALANCING, DESIGN APPROACH VELOCITY – 0.3 FPS @ 40 CFS.



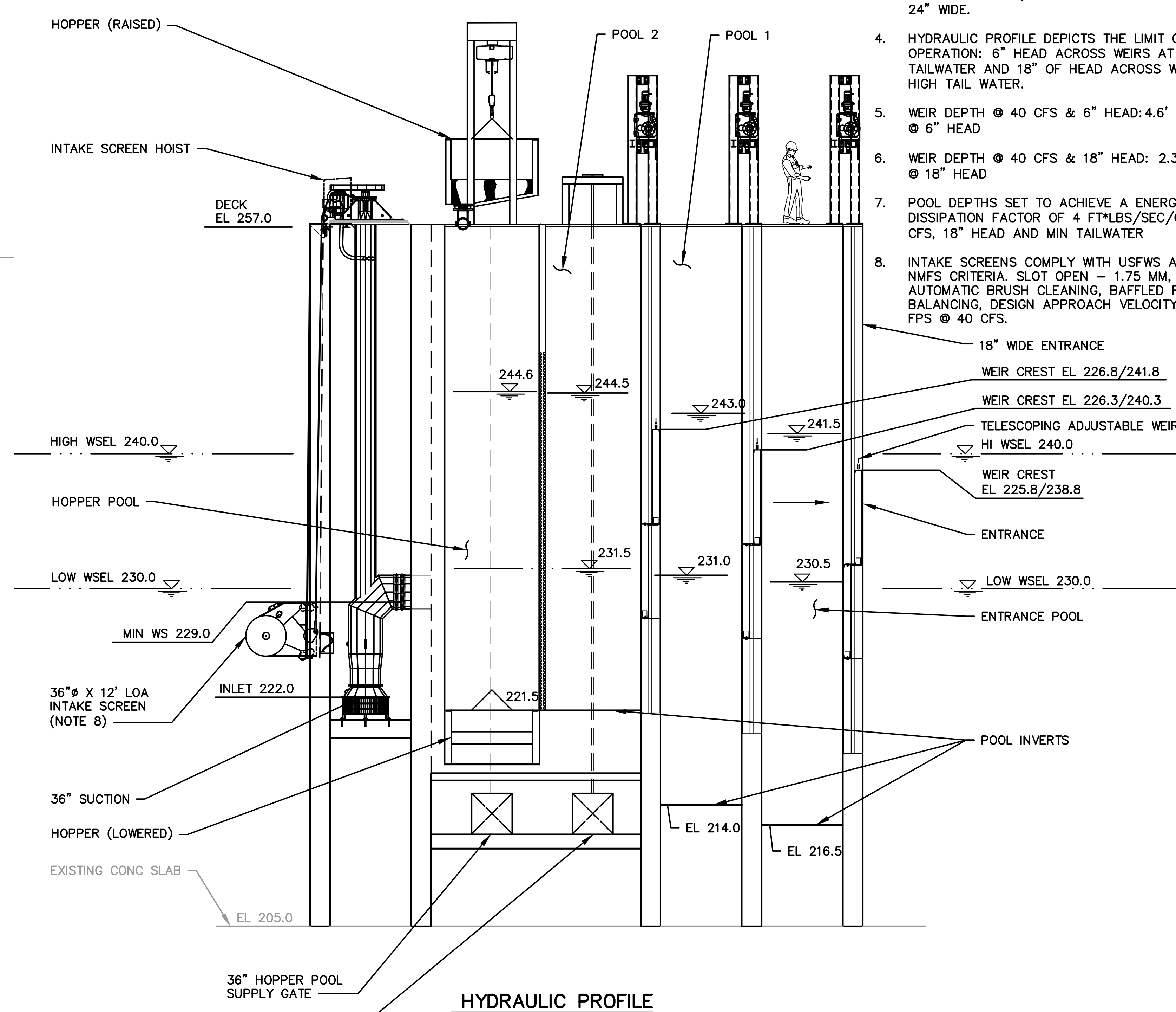
ENLARGED PLAN (2/3)

SCALE: 1" = 5'



ELEVATION–SIDE (A/5)

SCALE: 1" = 5'



HYDRAULIC PROFILE

SCALE: 1" = 10'

10 0 5 10

SCALE: 1"= 10'

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REDMOND, WA

LEWIS RIVER BULL TROUT PASSAGE
MERWIN UPSTREAM @ YALE TAILRACE

PLAN, ELEV & HYDRAULIC PROFILE

PACIFICORP HYDRO

SCALE: AS NOTED | SHEET 5 OF 11 | REV.

PLOT SCALE: 1 = 1:1

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VICINITY PLAN

SCALE: 1" = 100'

100 0 50 100

SCALE: 1"= 100'

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APPROVAL

LEWIS RIVER BULL TROUT PASSAGE
YALE UPSTREAM @
SWIFT BYPASS REACH
VICINITY PLAN

R2 Resource Consultants, Inc.
REDMOND, WA

PACIFICORP HYDRO

SCALE: AS NOTED SHEET 6 OF 11 REV.

PLOT SCALE: 1 = 1:1

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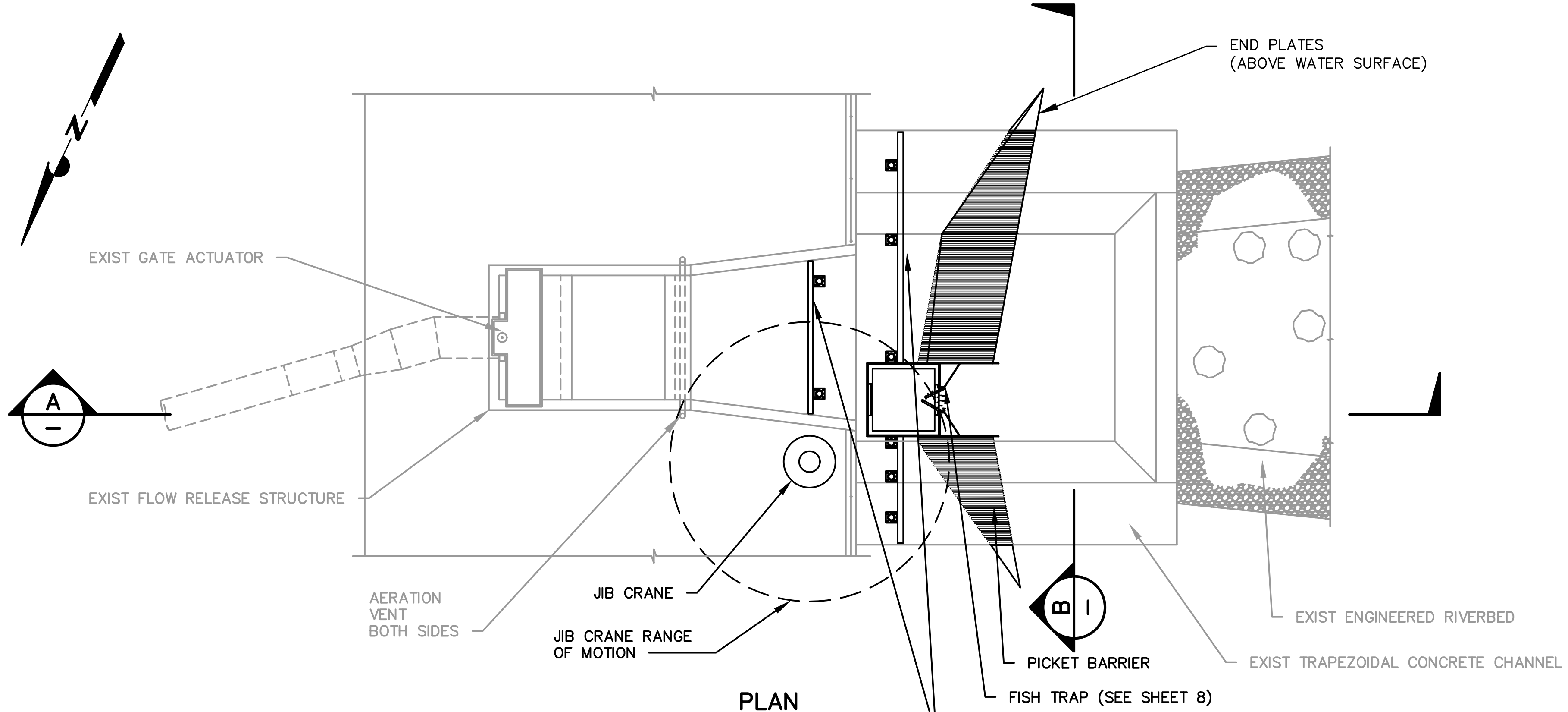
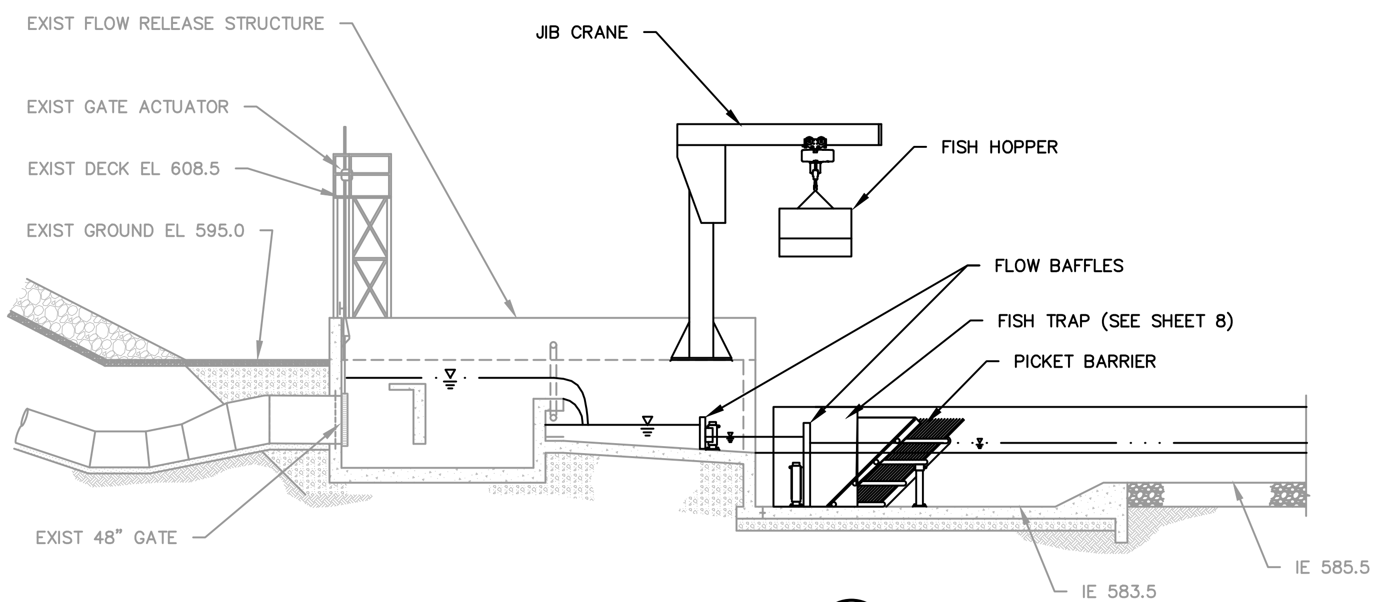


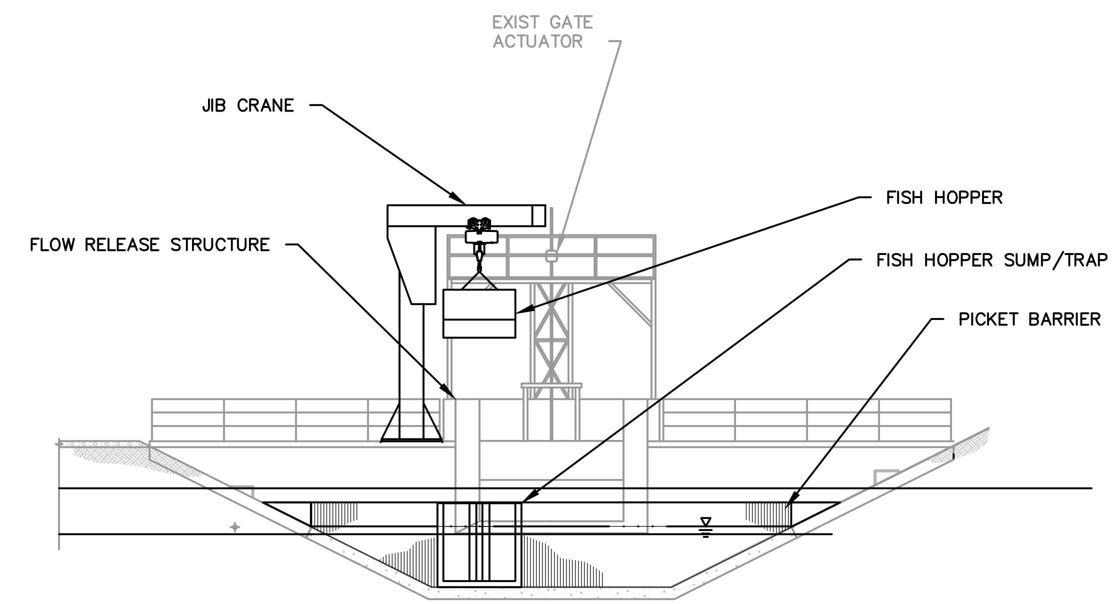
PLAN
SCALE: 1/16" = 1'-0"

NOTES:

1. TYPICAL FLOW: 76 CFS (15 @ TRAP + 61 @ PICKETS)
2. OPERATION SEASON: MAY – OCTOBER.
3. HOPPER: 6' X 6' X 4.5' DEEP RESULTING:
   SUBMERGED VOL: 162 CF (162 – 4 LB FISH)
   TRANSPORT VOL: 54 CF (100 – 4 LB FISH)
4. ALLOWANCE FOR FUTURE REFUGE (1" CLEAR SPACING) WITHIN HOPPER
5. PICKETS: 1.25" SCH40 PIPE WITH 1" CLEAR SPACING WITH 166.2 SF OF PICKET AREA
   PICKET FLOW 61 CFS RESULTING IN 1.0 FPS SLOT VELOCITY
6. PICKET ANCHORAGE: 6" SOLID PIPE POSTED ANCHOR TO CONCRETE CHANNEL.
7. POOL VELOCITY: 0.5 FPS @ 76 CFS
8. ALL TRAP COMPONENTS MEET USFWS AND NMFS CRITERIA.



PROFILE A
SCALE: 1/16" = 1'-0"



PROFILE B
SCALE: 1/16" = 1'-0"

SCALE: 1/16"=1'-0"
16 12 8 4 0 16 32

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DR DEP/R2	CH DEP/R2
APPROVAL	

LEWIS RIVER BULL TROUT PASSAGE
YALE UPSTREAM @
SWIFT BYPASS REACH
PLAN AND PROFILE

R2 Resource Consultants, Inc.
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PACIFICORP HYDRO

SCALE: AS NOTED SHEET 7 OF 11 REV.

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PLOT SCALE: 1 = 1:1

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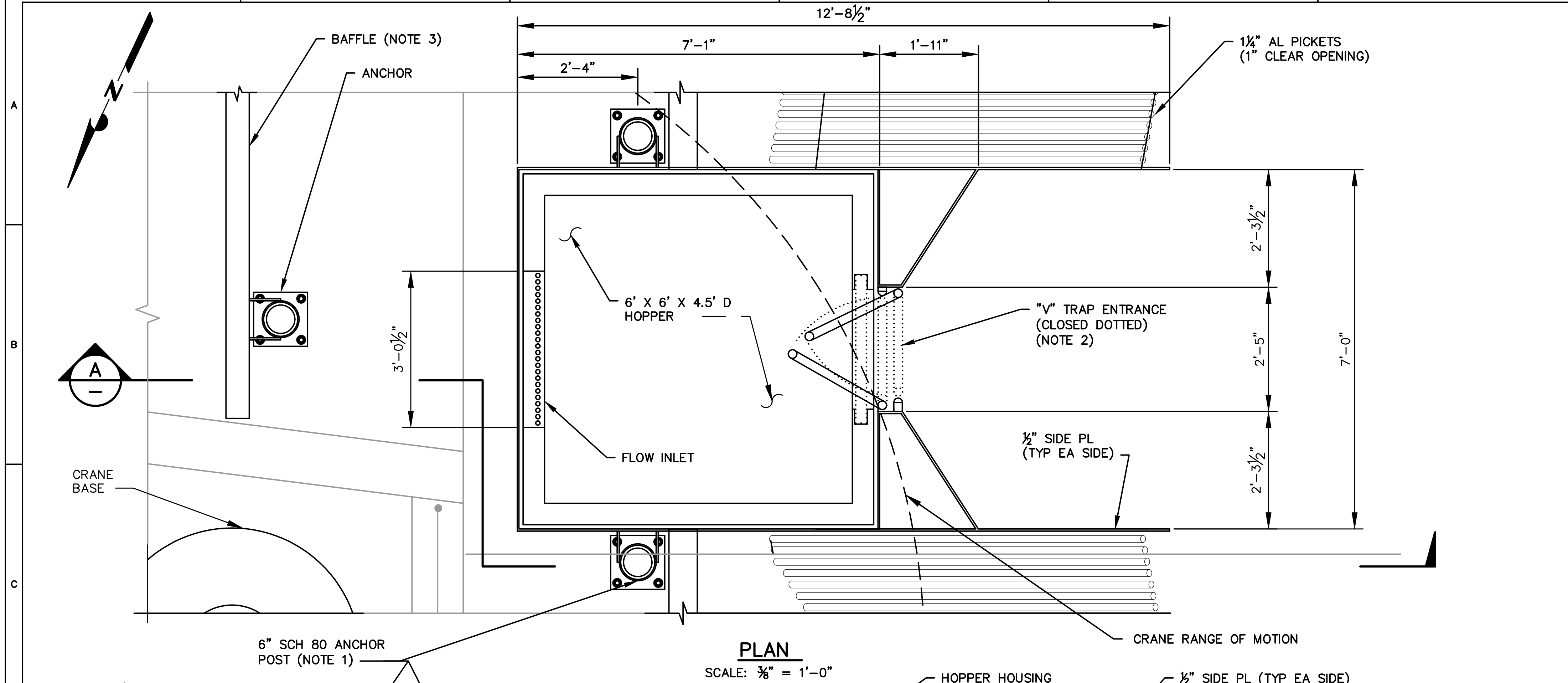
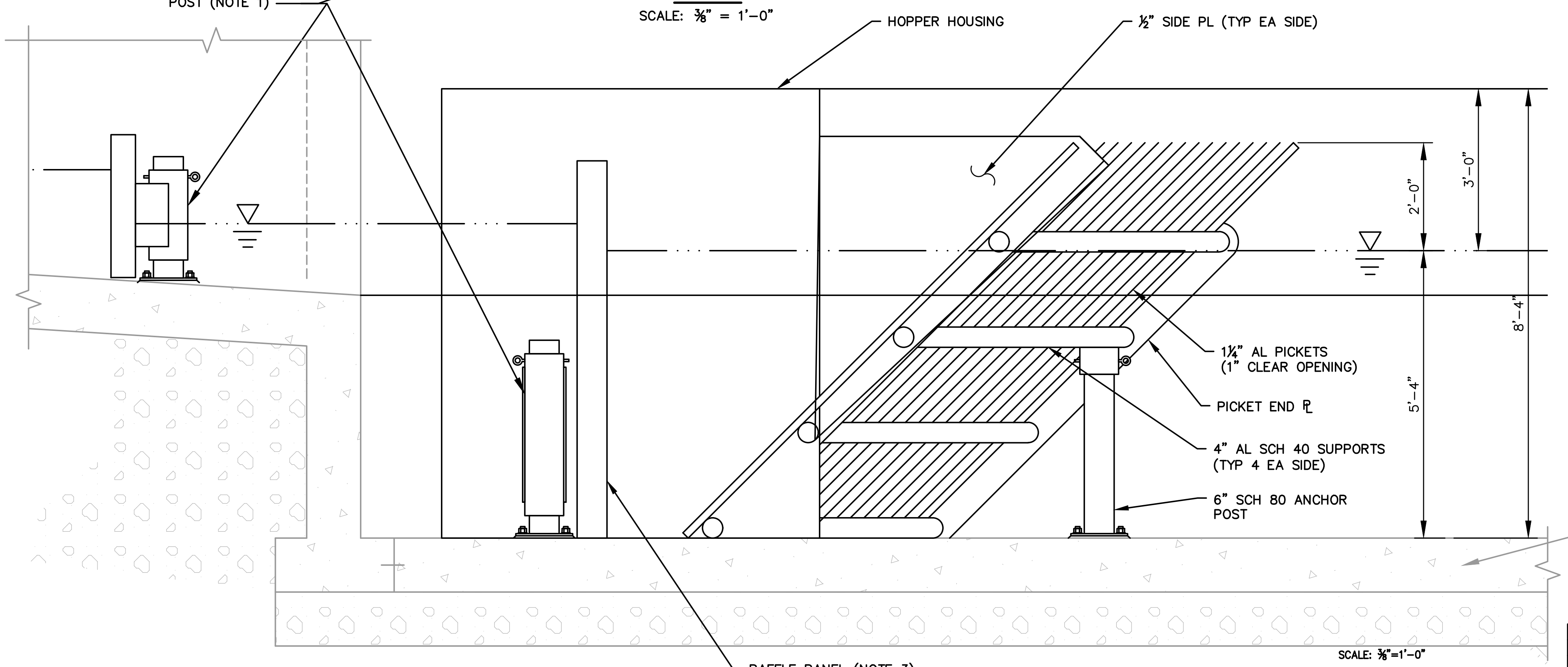


PLAN
SCALE: ⅜" = 1'-0"



SECTION
SCALE: ⅜" = 1'-0"

A

NOTES:

1. TRAP, TRAP HOUSING, PICKET BARRIER, BAFFLE PANEL, AND ACCESS PLATFORMS (NOT SHOWN) SHALL BE ANCHORED TO EXISTING CONC CHANNEL WITH 6" POST ANCHORED TO THE DECK AND 8" DIA SHEAVES OR CAPS PINNED TO THE 6" DIA POSTS.
2. "V" TRAP ENTRANCE PANELS ARE HINGED TO SWING CLOSED WHEN LIFTING THE HOPPER AND TO ALLOW FOR AND ADJUSTABLE OPENING (3–5 INCHES).
3. BAFFLE PANELS SHALL DISTRIBUTE FLOW WITH 3" HOLES AND A 15% POROSITY.

SCALE: ⅜"=1'-0"
0 6" 1' 2' 3' 4' 6'

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LEWIS RIVER BULL TROUT PASSAGE
YALE UPSTREAM @
SWIFT BYPASS REACH
PLAN AND SECTION

PACIFICORP HYDRO

SCALE: AS NOTED | SHEET 8 OF 11 | REV.

PLOT SCALE: 1 = 1:1

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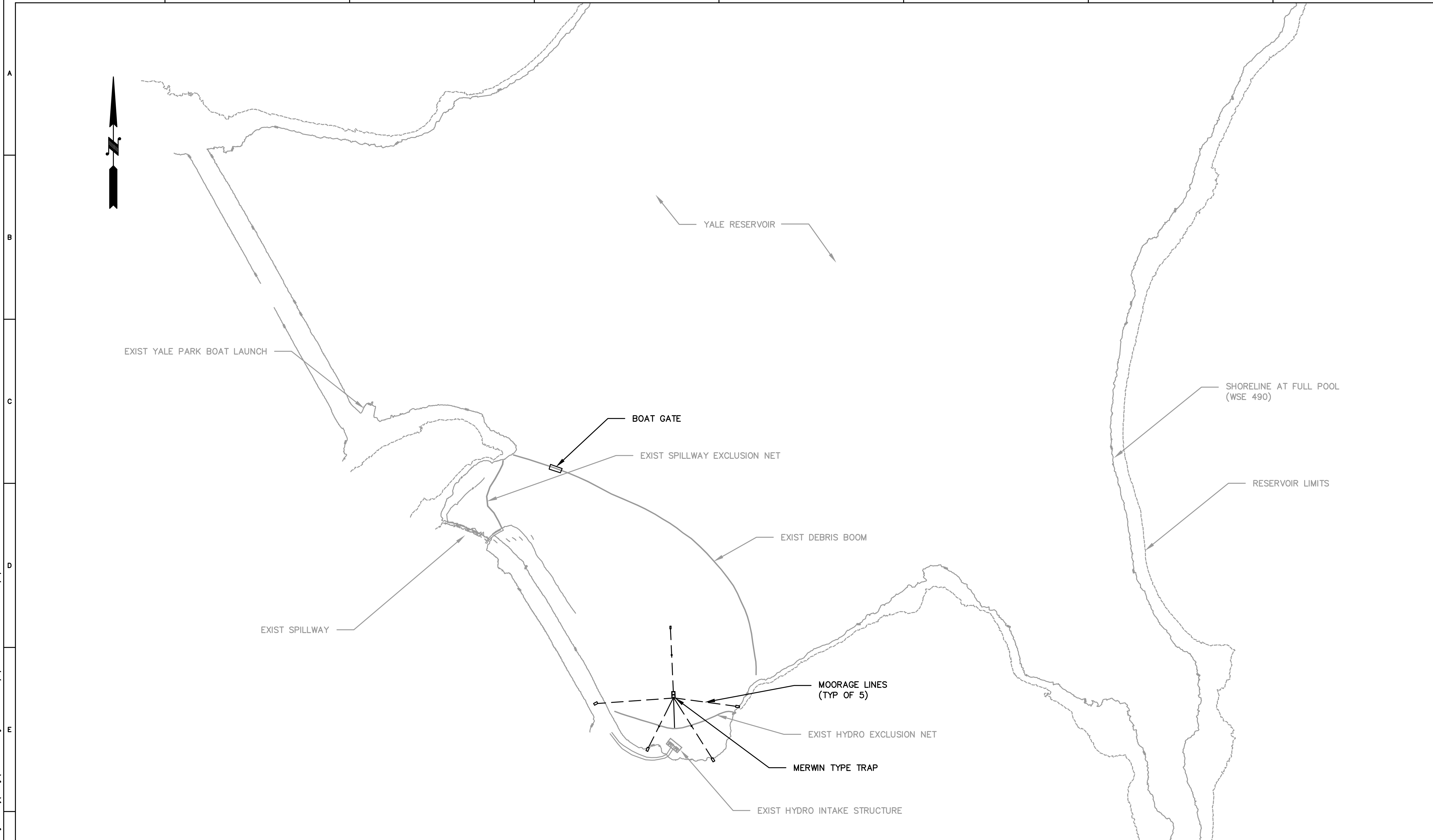

VICINITY PLAN

SCALE: 1" = 500'

500 0 250 500

SCALE: 1"= 500'

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LEWIS RIVER BULL TROUT PASSAGE
YALE DOWNSTREAM @ YALE INTAKE

VICINITY PLAN

PACIFICORP HYDRO

SCALE: AS NOTED | SHEET 9 OF 11 | REV.

PLOT SCALE: 1 = 1:1

REFERENCE DRAWINGS | DRAWING No. | REFERENCE DRAWINGS | DRAWING No. | BY | CHK | APP | REVISION | No. | DATE | BY | CHK | APP | REVISION | No. | DATE

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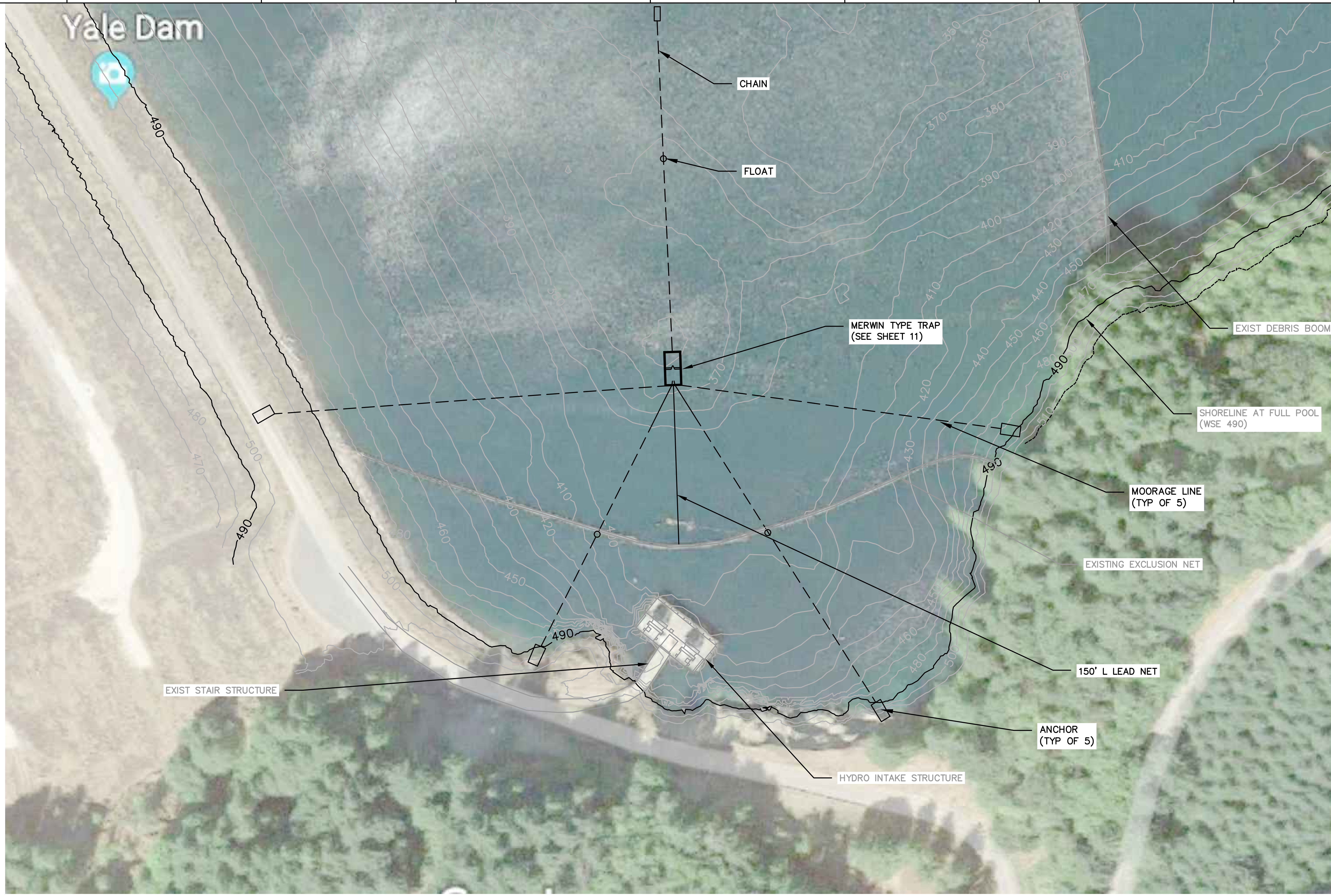

SITE PLAN

SCALE: 1" = 100'

100 0 50 100

SCALE: 1"= 100'

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DATE 07/16/2019	
ENG FEP/R2	DES FEP/R2
DR DEP/R2	CH DEP/R2

APPROVAL

LEWIS RIVER BULL TROUT PASSAGE
YALE DOWNSTREAM @ YALE INTAKE

SITE PLAN

R2 Resource Consultants, Inc.
REDMOND, WA

PACIFICORP HYDRO

SCALE: AS NOTED SHEET 10 OF 11 REV.

PLOT SCALE: 1 = 1:1

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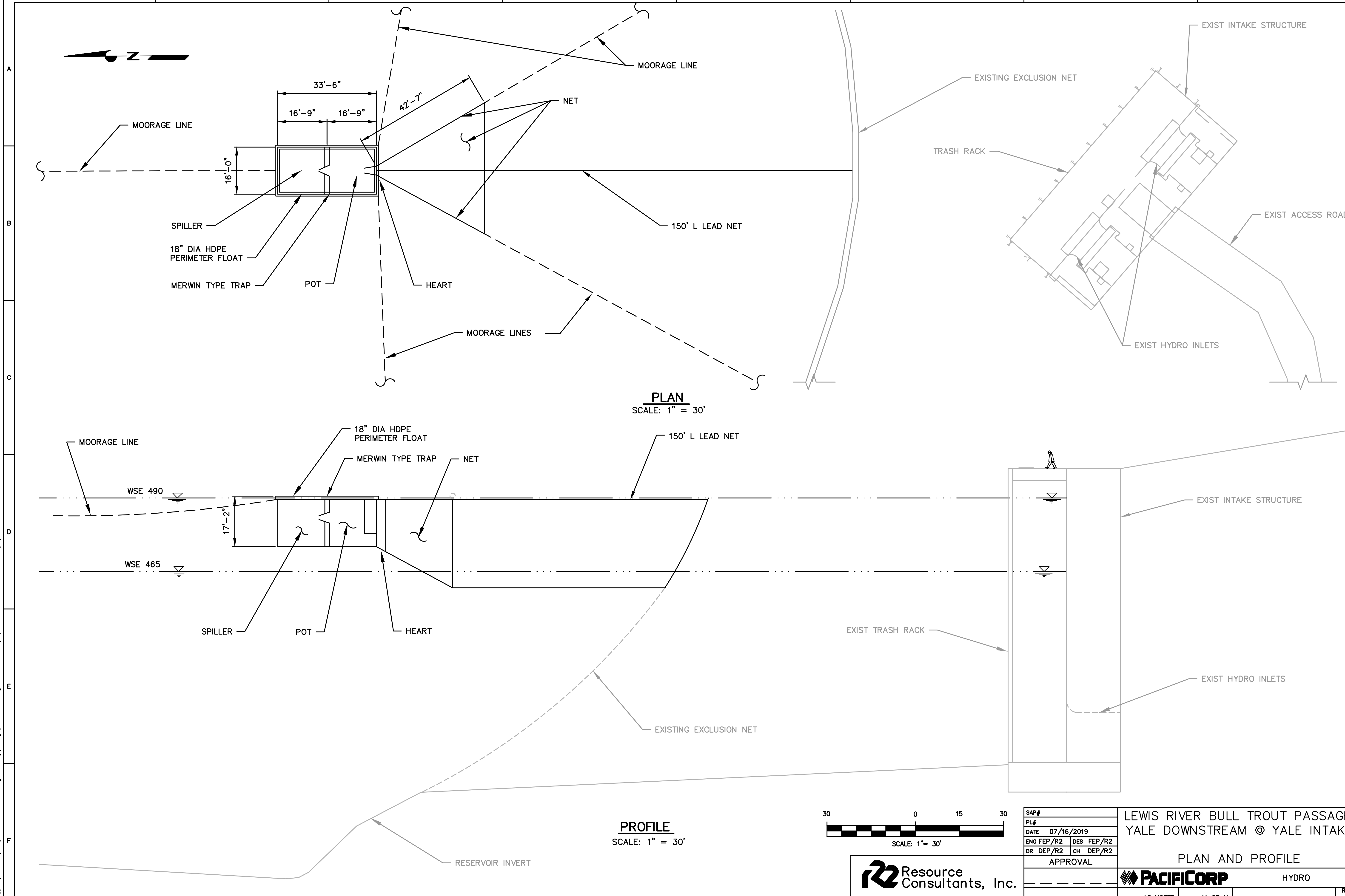

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DR DEP/R2 CH DEP/R2
APPROVAL

LEWIS RIVER BULL TROUT PASSAGE
YALE DOWNSTREAM @ YALE INTAKE

PLAN AND PROFILE

PACIFICORP HYDRO

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REDMOND, WA

SCALE: AS NOTED SHEET 11 OF 11 REV.

PLOT SCALE: 1 = 1:1

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APPENDIX B - Technical Memorandum, Criteria for Bull Trout Passage Facilities

15250 NE 95TH STREET
REDMOND, WA 98052
425.556.1288
r2usa.com

Technical Memorandum

Date: October 2, 2019 Project Number: 2241.01/TM001

To: Ian McGrath, PacifiCorp

From: Frank Postlewaite, P.E.

Cc: Dana Postlewait, P.E.

Project: Lewis River Bull Trout Passage

Subject: Criteria for Bull Trout Passage Facilities

This Technical Memorandum presents supporting criteria for the Lewis River Bull Trout Passage Plan and, in particular, the preliminary design of Bull Trout passage facilities to be constructed at three locations at the Lewis River Hydroelectric Project. The three locations for Bull Trout trapping facilities are presented and described. These descriptions include similar facilities that may be applicable at each site. The site locations are followed by an outline of criteria used to guide the preliminary design.

1. Locations

The locations that are selected for Bull Trout passage facilities include the two upstream facilities followed by the downstream facility. The first facility that is presented is located at the Yale Tailrace adjacent to the downstream side of the powerhouse to provide upstream passage from the Merwin Reservoir. The second facility is located at the upstream end of the Swift Bypass reach to provide upstream passage from the Yale Reservoir. The last location is at the Yale Forebay adjacent to the hydro intake structure which provides downstream passage from the Yale Reservoir. Figure 1 depicts these locations.

1. Merwin Upstream @ Yale Tailrace (Section 1.1)
2. Yale Upstream @ Head of Swift Bypass Reach (Section 1.2)
3. Yale Downstream @ Yale Forebay (Section 1.3)

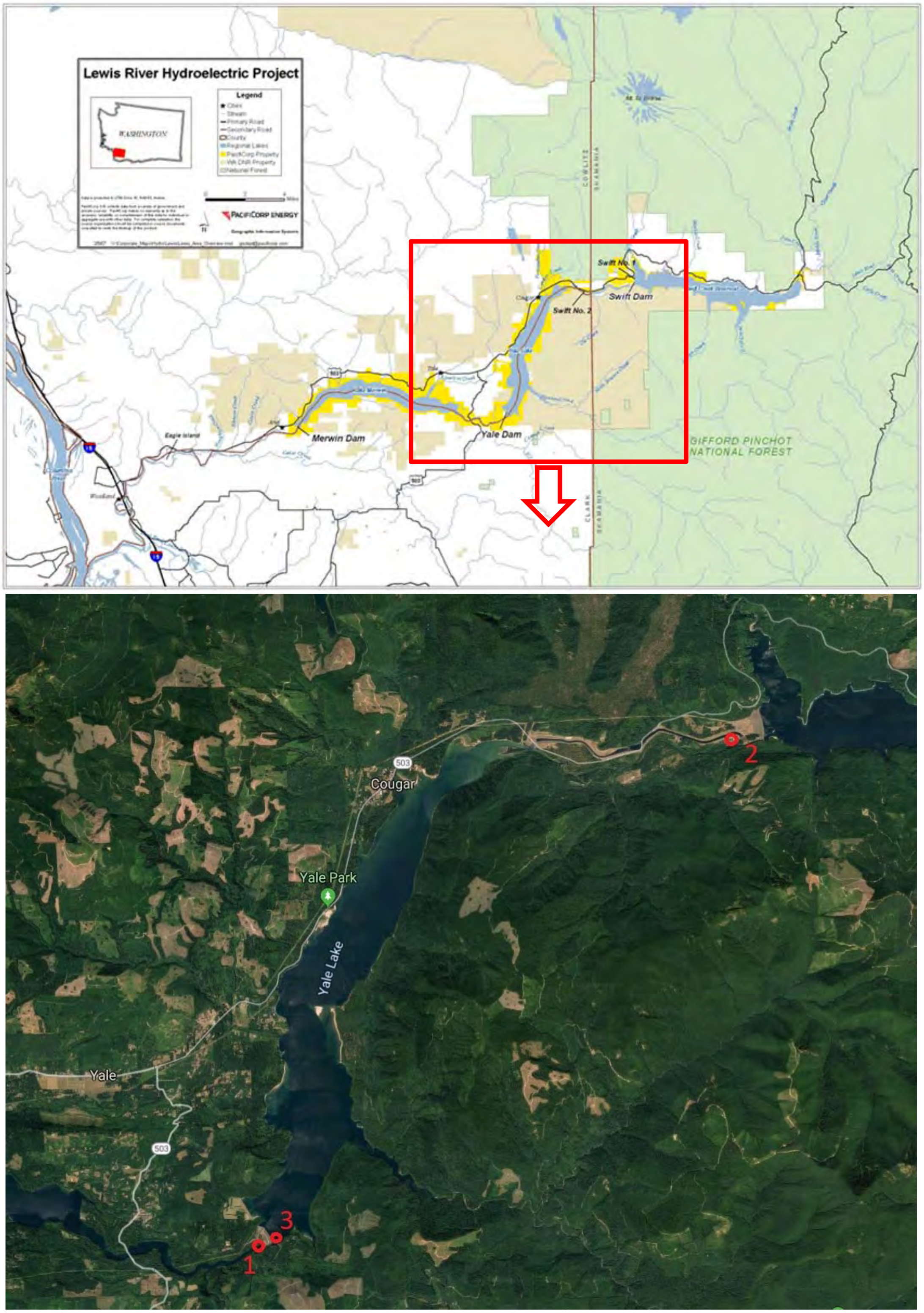

Figure 1. Bull Trout passage locations.

1.1 Yale Tailrace (Upstream Migrants)

The Yale Tailrace location is at the upstream end of the Merwin Reservoir adjacent to the Yale powerhouse. The trap is intended for capturing Bull Trout that intend to migrate upstream from the Merwin reservoir. Figure 2 depicts the tailwater area at a relatively full pool condition. Figure 3 depicts the Merwin Reservoir downstream of the powerhouse. Figure 4 depicts the downstream wall of the Yale powerhouse where the trap is anticipated to be installed.

Figure 2. Yale Powerhouse.

Figure 3. Yale Powerhouse looking downstream.

Figure 4. Downstream wall of Yale Powerhouse.

The following outline presents information that is used to guide the design at this specific location (Section 2 presents general criteria applicable to all locations):

1. Upstream season (May – October)
2. Permanent structure
3. Tailwater fluctuation: 10.0 feet (see Figure 5)

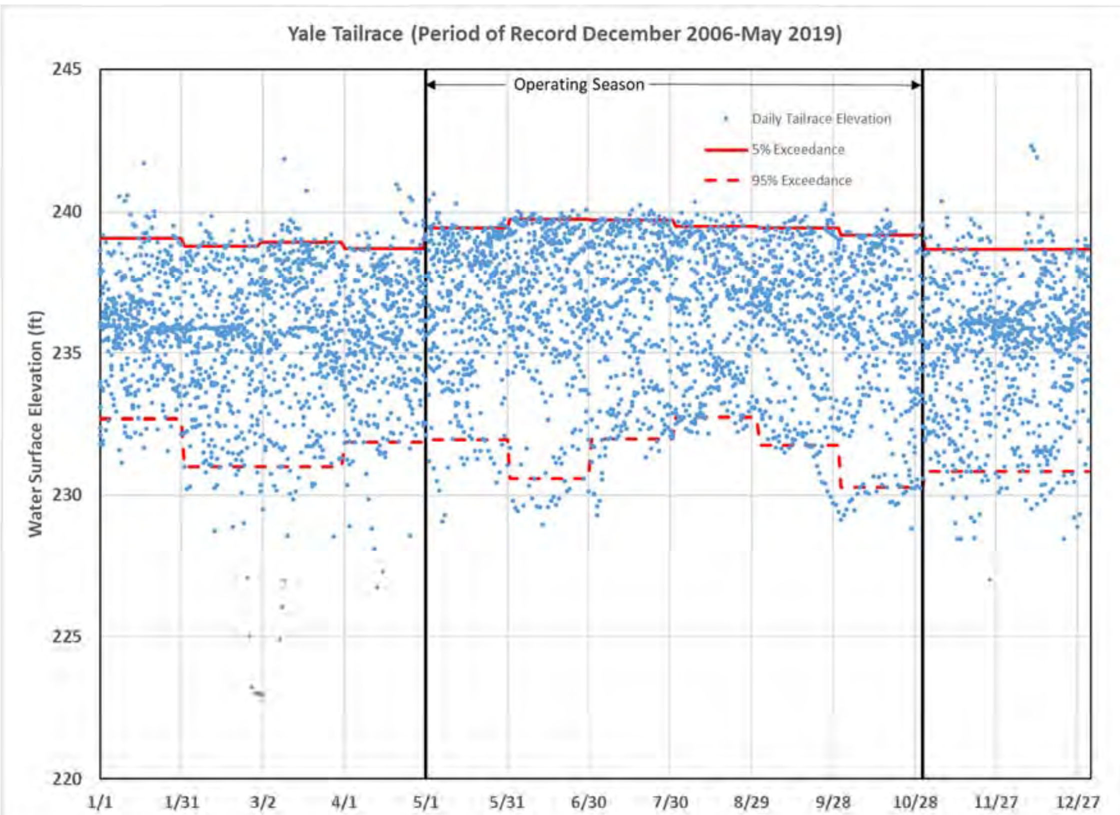

Figure 5. Yale tailwater elevations for Bull Trout migration timing.

4. Multiple pools with adjustable flow and head conditions
5. Adjustable head range across pool weirs: 0.5 to 1.5
6. Screened auxiliary water pump station
    a. Screen to meet NMFS and USFWS criteria
    b. 1.75 slot openings
    c. 0.4 feet per second maximum design approach velocity.
    d. Automatic brush screen cleaning (triggered on timer and differential)

7. Attraction flow: 20 to 40 cfs
8. US entrance attraction flow orientation: Jet oriented parallel to bank of river or reservoir
9. Entrance width: 2.0 ft
10. Minimum Flow Depth: 2.0 ft
11. Minimum pool dimensions: 7 feet wide x 7 feet long
12. Use hopper style mechanism for fish transport.
13. Refuge area in holding pool: 1-inch spacing (removable basket)

1.2 Swift Bypass Reach (Upstream Migrants)

The Swift Bypass Reach location is at the uppermost end of the reach at the control structure that draws water from the Swift No.1 Tailrace and supplies water to the reach. The trap is for capturing Bull Trout that intend to migrate upstream from the Yale reservoir and the Swift Bypass Reach. Figures 6 and 7 depict this location.

Figure 6. Swift bypass reach (looking downstream from the flow control structure).

Figure 7. Swift bypass reach (looking upstream from the flow control structure).

The following outline presents information that is used to guide the design at this location.

1. Outlet of Reach Water Supply
    a. Inverted Siphon
    b. Flow Meter used to modulate gate to maintain desired flow
    c. Inundated during spill events in excess of 5,000 cfs
    d. Subject to significant bedload movement at spill events in excess of 5,000 cfs
    e. Regulated flow in 50 to 100 cfs range (design flow of 76 cfs)
2. Upstream Season (May – October)
3. Bypass Design Flow: 76 cfs
4. Can operate up to a 5,000 cfs Spill Event
    a. Probability of Spill during operation: very low for operating period
    b. Removable or robust features are needed to prevent damage
5. Semi-Permanent Facility (10-year life)
6. Picket barriers:

  a. NOAA 5.3.2.1: Openings < or equal to 1 inch and the average design river velocity through pickets should be less than 1.0 ft/s for all design flows, with maximum velocity less than 1.25 ft/s, or half the velocity of adjacent passage route flows whichever is lower. The average design velocity is calculated by dividing the flow by the total submerged picket area over the design range of stream flows

7. Picket Barrier leading to a live box (hopper)

<u>Example – Graves Creek</u>

There is a successful bull trout trap using a picket barrier located on Graves Creek, a stream in Montana. Figures 8, 9, and 10 depict the Graves Creek project that utilized picket barriers on a stream for effectively traps adult Bull Trout migrating upstream to spawn.

Figure 8. Graves Creek Bull Trout trap looking downstream.

Figure 9. Graves Creek Bull Trout trap looking upstream.

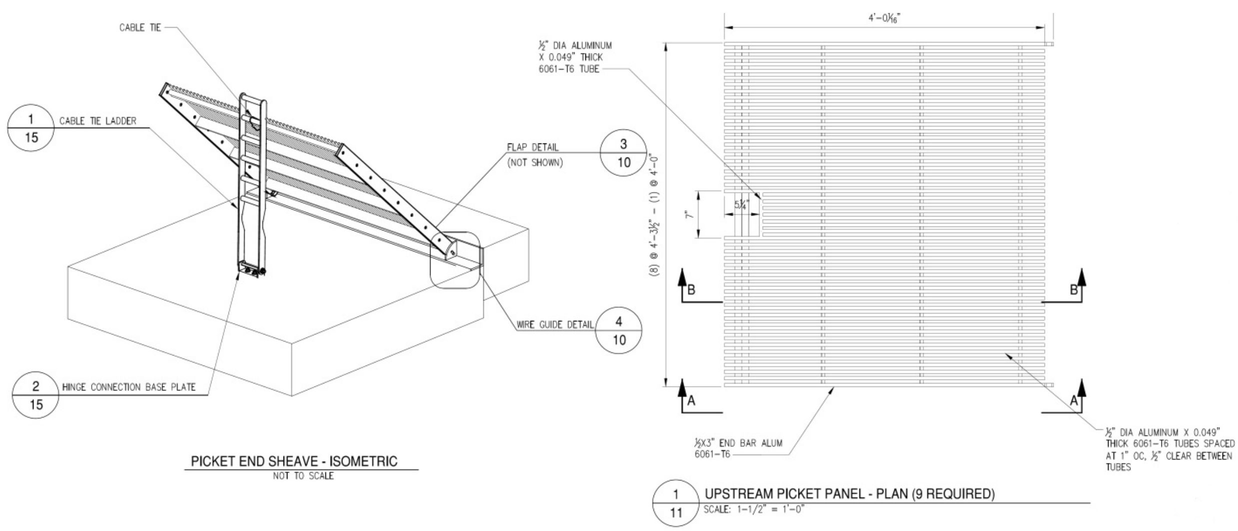

Figure 10. Upstream picket barrier panel at Graves Creek.

Graves Creek Features:

1. Design flow: 60 cfs
2. Live box: 10 cfs
3. Picket spacing 0.5" clear downstream panels / .75" upstream panels
4. Pickets:
    a. 38.3 ft long x 4 ft
    b. Area 153 sf maximum.
    c. 50% open area clean
    d. 0.8 fps slot velocity clean

1.3 Yale Forebay (Downstream Migrants)

The Yale Forebay location is at the downstream end of the Yale Reservoir adjacent to the hydro intake structure. The trap is intended for capturing Bull Trout seeking to migrate downstream from the Yale reservoir. Figure 11 depicts the intake structure and associated exclusion net at near full pool condition. Figure 12 depicts the construction of the intake structure. Figure 13 presents an isometric depiction of the Merwin type trap intended for use at this location.

Figure 11. Yale hydro intake structure at high pool.

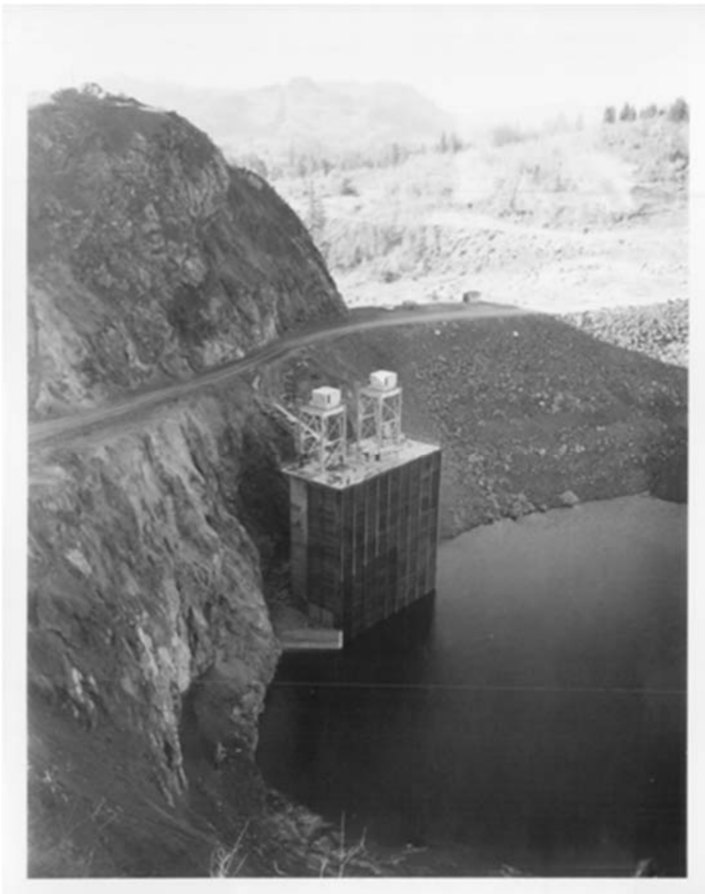

Figure 12. Yale hydro intake structure at low pool during construction.

The following outline presents information that is used to guide the design at this location:

1. “Merwin Trap” type net assembly
2. Located adjacent to the hydro intake
3. Integrated with the exclusion net
4. Passive trap (no induced flow)
5. Serviced by boat
6. Water surface elevation range 227 to 240 feet.

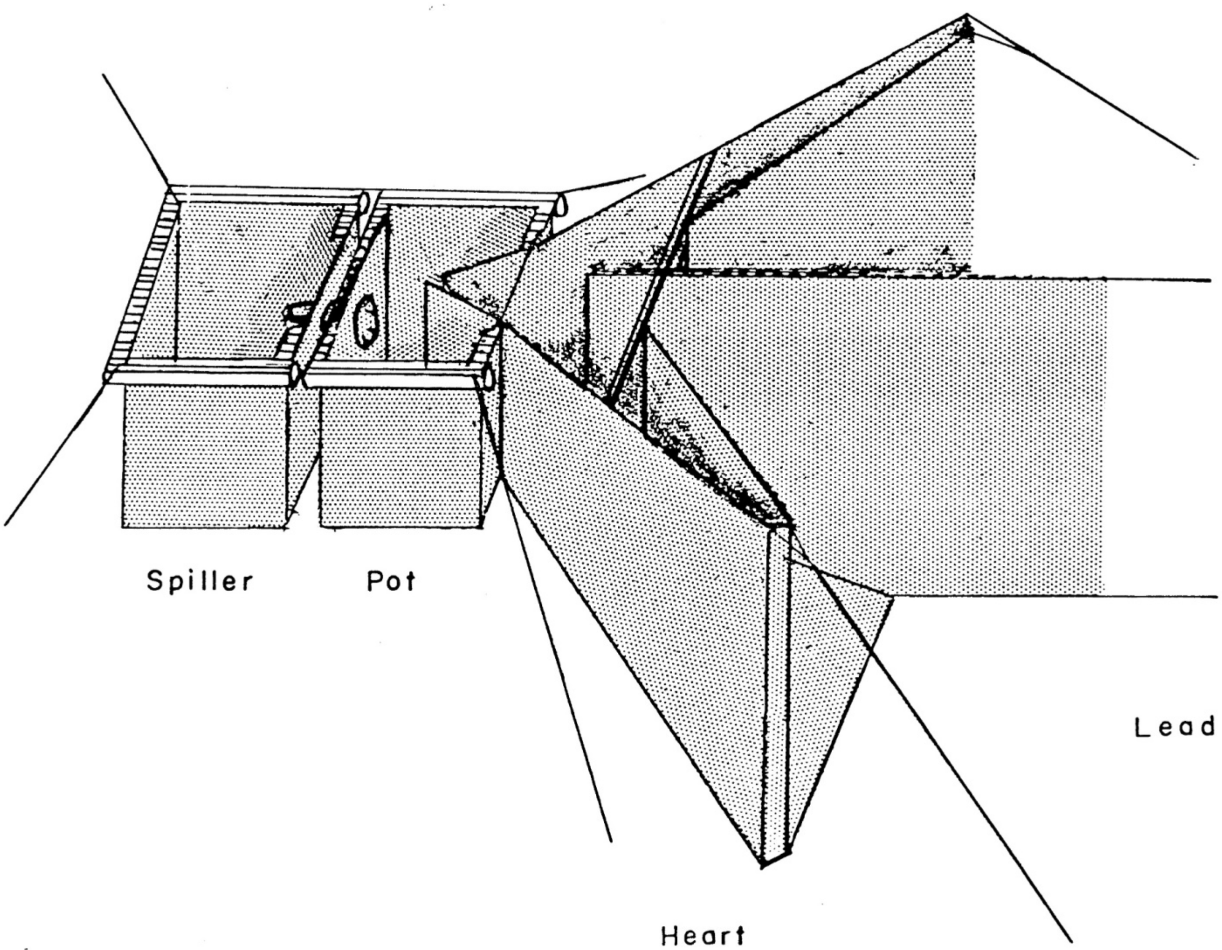

Figure 13. Lake Merwin floating trap (Hamilton – Use of Hydroelectric Reservoir for Rearing of Coho Salmon, 1970).

2. Criteria

The following outline presents criteria that are used to guide the general design.

1. Target species – Bull Trout
2. Other species – Kokanee, trout
3. Average fish size:
    a. Adult Bull Trout – 4 lb/fish
    b. Sub-adult Bull Trout – 1 lb/fish
    c. Kokanee – 0.4 lb/fish
    d. Trout – .75 lbs/fish
4. Upstream Bull Trout trapping season (May – October)
5. Downstream Bull Trout trapping season (March – June)
6. Max design day fish capture:
    a. Yale Upstream - Swift bypass reach:
        i. Adult Bull Trout – 5 fish/day (20 lb/day)
        ii. Sub-adult Bull Trout – 5 fish/day (5 lb/day)
        iii. Kokanee – 200 fish/day (80 lb / day)
        iv. Trout – 10 fish/day (7.5 lb / day)
    b. Yale Downstream - Yale forebay:
        i. Sub-adult Bull Trout – 2 fish/day (2 lb/day)
        ii. Northern Pike Minnow – 100 fish/day (2 lb/day)
    c. Merwin Upstream - Yale tailrace:
        i. Adult Bull Trout – 5 fish/day (20 lb/day)
        ii. Sub-adult Bull Trout – 5 fish/day (5 lb/day)
        iii. Kokanee – 400 fish/day (160 lb / day)
        iv. Trout – 10 fish/day (7.5 lb / day)
7. Holding pool volume:
    a. NOAA 6.5.1.2: 0.25 cf / lb of fish (1.9 gal / lb of fish @ temp < 50°F)
8. Holding pool flow:
    a. NOAA 6.5.1.3: 0.67 gpm / adult anadromous fish

9. Holding and transport volume segregation:
   a. Differentiate fish at 450 mm fork length
   b. Bull Trout girth (width) at 450 mm fork length: 3.2 inches (see Figure 14).
   c. Clear opening bar width: 1.0 inches

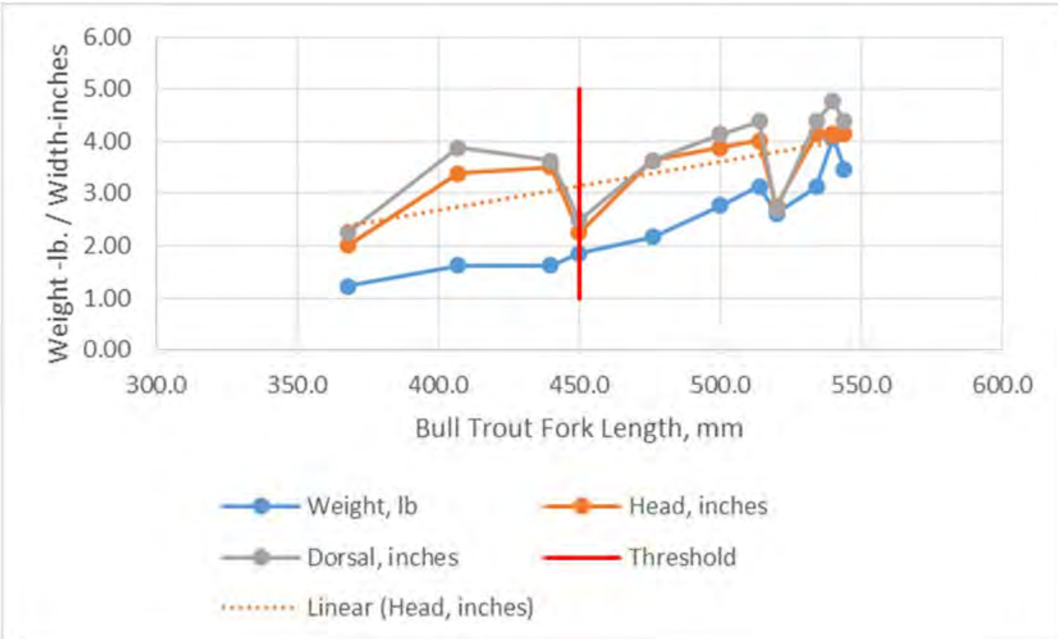

Figure 14. Bull Trout biometrics from 11 fish at Upper Baker FSC on 5/15/2019.

10. Transport volume:
    a. 1 gal/lb of fish (2019 Bull Trout passage plan)
    b. NOAA 6.5.1.2: 0.15 cf / lb of fish (1.1 gal / lb of fish)
11. Transport truck appurtenances:
    a. Oxygen (tank and air stone)
    b. Recirculation system:
       i. Bell: turnover of volume every 5 – 7 minutes (36 to 50 gpm for 250 gal truck)
       ii. NOAA 6.5.1.3 0.67 gpm per adult fish (7 gpm for 10 fish)
    c. Dissolved oxygen monitoring
12. Transport temperature conditions:
    a. Receiving water < 18°C (64.4°F) 16°C max recommended

    b. Temperature difference < 3°C
    c. Tempering required if differential exceeds 3°C

13. Transport trucks available:
    a. 250 gallon (223 lbs of fish)
    b. 1,800 gallon (1636 lbs of fish)
14. Truck disinfection:
    a. Treat daily with 12.5% bleach diluted 1 part to 6,000 parts water (5.3 fl oz per 250 gallons)
    b. Dechlorinate with sodium thiosulfate (160 g / 250 gallons)
    c. Test chlorine residual (should make sure sodium thiosulfate residual is zero also)
15. Upstream season: May thru October (spawning migration)
16. Downstream season: March thru June (smolt outmigration)
17. Trap operation:
    a. 24 hour per day 7 days per week during season
    b. Checked daily
18. Sampling activities:
    a. PIT tag scanning
    b. PIT tag un-tagged fish (23mm tag for fish > 250mm / 12mm for fish<250mm)
    c. Sample genetic material
    d. Measure fork length

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CONSULTATION RECORD

Yale Hydroelectric Project
(FERC No. P-2071)

Consultation Record Leading to Utilities Application to FERC for License Amendments for Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects

Date	Event	Summary
11/10/2011	ACC Meeting	PacifiCorp notes that per Section 4.1.9 of the Settlement Agreement, it has put together a scope of work for related studies and the intent is to have a third party conduct the studies. Scope of work has been reviewed by NMFS and USFWS and both agencies were accepting of the scope. PacifiCorp will send the scope of work to ACC representatives.
12/8/2011	ACC Meeting	PacifiCorp reported that a Request for Proposal had been sent out to a number of universities, but no one had yet submitted a proposal; they need more time. PacifiCorp will give them additional time.
1/12/2012	ACC Meeting	The Request for Proposal was restructed and resent to universities; bids are due today.
2/9/2012	ACC Meeting	PacifiCorp has made a selection on contractor, but cannot share that information at this time until a contract is tendered. We will provide a study plan to the ACC so that everyone is aware of the work being performed. We anticipate data collection to begin late spring or early this summer.
3/8/2012	ACC Meeting	Selection has been made for research group but contracting is not yet complete. Work is expected to begin summer 2012. The selected research group will be invited to an ACC meeting to discuss the study plan, timeline, etc. with a goal of year 2016 to provide a package to the ACC and Services on information they have learned.
4/12/2012	ACC Meeting	PacifiCorp still negotiating with the contractor. Upon completion of contract the successful contractor will be announced and they will begin work this summer.
5/10/2012	ACC Meeting	Procurement is working with potential contract. They are very close; Shrier will let everyone know when this happens and will talk about study plans.
10/11/2012	ACC Meeting	Contractor is in place. Dr. Robert Al-Chokhachy, Research Fisheries Biologist with US Geological Survey and Dr. Dave Beauchamp, University of Washington, have been selected. Dr. Robert Al-Chokhachy will be presenting to the ACC at the next meeting on November 8, 2012. Shrier will email the scope of work to the ACC for its review.
11/8/2012	ACC Meeting	PowerPoint presentation: Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River, dated November 8, 2012 by Dr. Robert Al-Chokhachy
12/13/2012	ACC Meeting	Working with appropriate agencies on permitting activity.
1/10/2013	ACC Meeting	Reviewing current information; proceeding strong in March 2013. PacifiCorp and the contractor are working with appropriate agencies on permitting activity.
3/14/2013	ACC Meeting	Study team coming up river in two weeks for 2 days tagging fish for study purposes.
4/11/2013	ACC Meeting	Study team currently conducting hydro acoustic surveys.
5/9/2013	ACC Meeting	Conducting review of all work completed to date to establish baseline; used hydrocoustic to determine where …… start in earnest next month with data collection. - Food habitat - Isotope analysis - Pick up stable isotope samples to begin analysis
6/13/2013	ACC Meeting	The research team is collecting stomach samples, gill netting, and collection tissue samples. Consultant has permits from USFWS and NMFS. Working on nailing down stable isotope diet; other half of team to begin next week to conduct habitat work; look at all barrier survey work in early 2000 era. Also look at EDT model again; where data update is needed; more refined assessment, spawning habitat, etc., review of all work completed to date to establish baseline.
7/11/2013	ACC Meeting	Study work well under way; collecting pike minnow for population estimates to assess predation potential. Researchers are also verifying anadromous fish barriers and other habitat work completed in the past including GPS of all the significant barriers. In addition they are collecting biological samples to fill in the gaps from the baseline study.

Date	Event	Summary
8/8/2013	ACC Meeting	Contractors are working every day; University of Washington collecting pike minnow and tagging as part of predator population assessment. USGS conducting a lot of stream survey work; genetic analysis; to determine the difference from the 2009 baseline compared to today's samples.
9/12/2013	ACC Meeting	Clear Creek pit tag detection system is in; 7 hits in the first day (acclimation fish PacifiCorp planted in Spring 2013).
10/10/2013	ACC Meeting	The PIT tag antenna placed near the mouth of Clear Creek detected several fish right away. It turns out that those fish were part of the 80,000 spring Chinook Acclimation release in April. This helps to understand where some of those fish went since very few were detected at the Swift FSC. Continuing with predator population assessment; 2nd phase in the fall. Researchers are working up population estimates of pike minnow in Merwin. They have also completed reviewing previous upstream barrier mapping, verifying the locations and putting them into GPS so we know the extent of where fish migrate. Upper basin surveys of coho and Chinook are helping us to find the spawners and how the barriers may or may not affect the extent of their migration.
11/14/2013	ACC Meeting	Samples that suffered from the freezer failure back in 2009 are still viable; collecting new data this year continues to add to the information database for stable isotope analysis. Pit tag detector on Clear Creek found 6 tags from acclimation coho that seemed to have remained in the upper watershed. One of those tagged coho was capture and eaten by an angler.
12/12/2013	ACC Meeting	Data collection for 2013 is complete.
1/9/2014	ACC Meeting	Stream flow and temperature data for many of the tributaries have been received; some tributary data not downloaded yet as they are still collecting data throughout the year.
2/13/2014	ACC Meeting	Preparing for next field season which begins March 2014 to evaluate Merwin and Yale for fish passage.
3/13/2014	ACC Meeting	Hydro acoustics completed last year to determine baseline fish population; PacifiCorp has not received the report yet; good chance of having coho and chinook adults available in 2014 to test migration, spawning and rearing success.
4/10/2014	ACC Meeting	Bringing annual report to PacifiCorp in May that summarizes the 2013 efforts and identifies the 2014 work; thanks to WDFW an additional 5,000 coho smolts were provided for release into Yale Lake for hydro acoustic tracking; leading to where a Yale surface collector could be positioned; the crew is working day and night to gather the necessary information.
5/8/2014	ACC Meeting	Kicking off next week for the 2014 season; will have final schedule very soon. The first draft of the annual report will be available for the June 2014 ACC meeting. Consultants noted that they detected two bull trout at Clear Creek; both went upstream and one came down in October 2013; exhibiting spawning behavior. The research group is focusing on Clear Creek for a grad student's thesis looking very closely at the ecology of anadromous and resident fish. They also have a full year of temperature and flow data in almost every tributary (Swift tributaries on down).
6/2/2014	ACC Meeting	PacifiCorp summarized the 2013 Annual report and discussed the stable isotope results in detail. A detailed annual report was provided to the ACC on June 5, 2014 which can be viewed on the Lewis River website at the following link (Attachment B): http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/LR_New_Inform_Progress_Report_May_2014.pdf

Date	Event	Summary
3/12/2015	ACC Meeting	New Information and Discussion of coho/bull trout interactions – Dr. Al Chokhachy per the ACCs request provided a thorough presentation to address new information and discussion of coho/bull trout interaction in relation to the reintroduction efforts on the Lewis River. Chokhachy provided a PowerPoint titled, “Assess Anadromous-resident Interactions”. While this document is not intended for public viewing at this time Chokhachy addressed the following: Objectives include the potential influences of anadromous salmon reintroductions on bull trout populations and any negative effects. Methods include, but not limited to, how coho are using the tributaries and snorkel surveys that will take place or have taken place. The number of bull trout observed for 2013 – 2014 and its biological significance were reviewed. Chokhachy reviewed coho growth relative to water temps and habitat or lack thereof. Bull trout isotope data, its collection and reservoir trophic interactions were discussed (the isotope results will be presented in the 2014 annual report). Chokhachy reviewed if juvenile bull trout and coho diets overlap and is there evidence of potential bull trout shifts in diet after reintroduction. Gastric lavage for diet data and fin clipsisotope samples were collected and will continue to be collected in 2015. Findings to date will be reported in the 2014 annual report. Also discussed was the potential for coho superimposition on existing bull trout and its potential effects. All existing bull trout and coho redd data will be used to identify extent of overlap of coho redds. Redd size measurement data will be collected to include length and width of redds. The 2015 efforts will include individual-based model of population-level effects of superimposition and sediment sampling. McCune will email a copy of the PowerPoint to all ACC participants. If the ACC has any questions about any aspect of the project tasks they were invited to contact Dr. Chokhachy.
8/13/2015	ACC Meeting	Dr. Al-Chokhachy: Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River This PowerPoint presentation can be viewed on PacifiCorp’s Lewis River website at the following link: http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/Al-Chokhachy_Lewis_ACC_2015.pdf Annual Progress Report - http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/LR_New_Inform_Progress_Report_August_2015.pdf
10/8/2015	ACC Meeting	New Information Annual Report: There was some confusion as to the need to comment on the 2014 annual report from Dr. Al- Chokhachy. Shrier asked that ACC members submit any comments or questions to him by October 22, 2015.
12/24/2015	ACC Subgroup Meeting	PacifiCorp invited interested ACC representatives to a meeting to review the inputs and assumptions to be used in development of the Lewis River EDT fish production model. Thereafter known as the ACC EDT subgroup, the subgroup conducted three separate meetings (January 21, 2016, February 19, 2016 and March 18, 2016). As an outcome of the first subgroup meeting and in support of the EDT for the lower Lewis River, PacifiCorp contracted Mason, Bruce and Girard to conduct a review of known aquatic restoration projects completed in the lower Lewis River basin.
2/11/2016	ACC Meeting	On February 11, 2016, PacifiCorp informed the ACC that it had contracted Dr. Phil Roni (Cramer Fish Sciences) to take a larger look at the North Fork Lewis River watershed. Specifically, Dr. Roni addressed issues and opportunities related to fish habitat and fish production; limiting factors by life stage and habitat type and opportunities for restoration. At the same ACC meeting, Dr. Roni provided a presentation on his study objectives and tasks. ACC meeting notes and Dr. Roni’s presentation are available at the following links: ACC Meeting Notes (Attachment A-1): http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/02112016_ACC_MN.pdf Dr. Roni’s Presentation (Attachment A-2): http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/LR_ACC_EDT_presen.pdf

Date	Event	Summary
4/14/2016	ACC Meeting	Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River – Dr. Robert Al-Chokhachy, USGS Dr. Robert Al-Chokhachy (USGS) provided a PowerPoint presentation titled, Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River and spoke to the six tasks below. Further detail can be viewed on the Lewis River website at the following link: http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/Al_Chokhachy_Lewis_ACC_Dec_2018_USGS_approved.pdf
4/14/2016	ACC Meeting	On April 14, 2016, new information presentations were given by Dr. Robert Al -Chokhacy (USGS), Mike Bonoff (Mason, Bruce and Girard), Kevin Malone (DJ Warren and Associates), Dr. Phil Roni (Cramer Fish Sciences), and Jeremiah Doyle (PacifiCorp) to the ACC. ACC meeting notes and presentations are available at the following links (Attachment A-3): http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/4142016_ACC_MN.pdf
4/25/2016		On April 25, 2016, PacifiCorp distributed to the ACC for a 30-day review and comment period, a draft of the document entitled “New Information Regarding Fish Transport into Lake Merwin and Yale Lake.” The document was a collection of study reports prepared by the U.S. Geological Survey and the various environmental consultants.
5/12/2016	ACC Meeting	PacifiCorp reminded the ACC attendees that the In Lieu Fish Passage draft study reports are out for a 30-day review and comment period. ACC comments are due by May 26, 2016. In regards to the EDT Modeling, PacifiCorp proposes that the ACC consider model runs that include turning adult harvest on, adjusting spring Chinook female egg fecundity and the transport proportion of fry collected in juvenile collection facilities. Kevin Malone, consultant with DJ Warren & Assoc. will prepare a memorandum regarding the proposed assumption changes to the EDT model, then run the model for ACC review. Malone will also address the sensitivity factor. The ACC agreed to another EDT subgroup meeting to, ID potential changes/new assumptions and run models with Malone in real time.
5/26/2016		Lower Columbia Fish Recovery Board emails comments in review of Draft New Information report to PacifiCorp
6/9/2016	ACC Meeting	PacifiCorp informed the ACC of the following In Lieu Fish Passage update: - June 13th - ACC EDT subgroup meeting (Merwin conference room 12:30 to 3:30 PM) to review “realistic” EDT model run assumptions and outputs, and provide update on restoration opportunity summary table. - June 24th - PacifiCorp to submit Final Study Reports to the Services and ACC. - Post June 24th – Additional meetings at discretion of Services. However, per Settlement Agreement, Services must conduct at least one meeting prior to December 26, 2016. - Within 60 days of the final Services/ACC meeting, Services to formally announce decision but no later than February 27, 2017.
6/24/2016		On June 24, 2016, the Utilities submitted the final New Information report to the Services and the ACC. Following the distribution of the New Information report, the Services expressed a desire to engage the ACC in discussions. To that end, PacifiCorp contracted PDSA Consulting and Mason, Bruce and Girard to facilitate collaborative discussions of the additional information with the intention to reach agreement on a recommendation to inform the Services’ decision.
9/8/2016	ACC Meeting	On September 8, 2016, the first of several meetings were conducted with the ACC Fish Passage Decision Group, a subset of the Lewis River ACC. Group discussions ended on May 11, 2017. A report of discussions and outcomes was prepared by the facilitators and is available at the following link (Attachment A-4): http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/Final_Decision_Support_July_28_2017%20(website).pdf
9/8/2016	ACC In Lieu Meeting	Review Settlement Agreement and Timeline Description of collaborative process to meet timeline High-level Recap of New Information provided by PacifiCorp. Identify Key Components that will feed into discussion process - List known components – key pieces of knowledge and considerations, from the new information and other sources - What else should be considered? (Brainstorm with group to add other components.)

Date	Event	Summary
9/28/2016	ACC In Lieu Meeting	Review Draft Decision Matrix - Celedonia Settlement Agreement Relevant Pieces – Olson, Miller Add/review list of key Components/Brainstorming
10/5/2016	ACC In Lieu Meeting	Review Objectives, Evaluation Criteria, Process/Perspective Define Passage and Restoration Parameters, Risks & Uncertainties for: 1. Yale: Downstream only + $20M for habitat restoration Downstream & upstream to Swift + $15M for habitat 2. Passage at both Yale & Merwin 3. Passage at neither + $30M habitat restoration Taylor Aalvik (Cowlitz Indian Tribe) communicated to the attendees that he participated in the Settlement Agreement (SA) process and the Tribe worked hard to get the fish passage language into the SA. Aalvik wanted to assure all attendees that the In-Lieu/fish passage topic is on his radar and calendar. He plans to attend as many meetings as possible or will send one of his staff members. It is the Cowlitz' Indian Tribe (CIT) intention to stay engaged in the In-Lieu discussions. This is a priority matter for the CIT and Aalvik may add additional staff to address the needs.
10/20/2016	ACC In Lieu Meeting	Review Objectives, Evaluation Criteria, Process/Perspective Define Passage and Restoration Parameters, Risks & Uncertainties for: 1. Yale: Downstream only + $20M for habitat restoration Downstream & upstream to Swift + $15M for habitat
11/3/2016	ACC In Lieu Meeting	Review Objectives, Evaluation Criteria, Process/Perspective Review existing information Continue to Define Passage and Restoration Parameters, Risks & Uncertainties for: Yale: 1A1: Downstream only + $20M for habitat restoration (Adults into Yale) 1A2: Downstream only + $20M for habitat (No adults into Yale) 1B: Downstream & upstream + $15M for habitat (Adults into Yale with adult passage over Swift dam)
11/17/2016	ACC In Lieu Meeting	Review existing information Continue to Define Passage and Restoration Parameters, Risks & Uncertainties for: Yale: Alternative 1B: Downstream & Upstream + $15M for habitat (Adults into Yale with adult passage over Swift dam) Alternative 2: Yale & Merwin Upstream and Downstream (Move all adult fish into Merwin) Alternative 3: Passage at neither + $30M for habitat (Move all adults into Swift; current scenario)
11/22/2016	ACC In Lieu Meeting	Review existing information Continue to Define Passage and Restoration Parameters, Risks & Uncertainties for: Alternative 3: Passage at neither + $30M for habitat (Move all adults into Swift; current scenario)
12/8/2016	ACC Meeting	Mark Celedonia (USFWS) provided the following decision process update to the ACC and expressed that the Services will not be making their decision by February 6, 2017 and the process will continue into early 2017. The Services will request a six (6) month extension request from the FERC as will the Utilities. In Lieu Workgroup – Memorandum to the ACC, Todd Olson (PacifiCorp) informed the attendees that the Utilities consider this December 8, 2016 ACC meeting official satisfaction of its requirement to convene a meeting with the ACC in accordance with Section 4.1.9 of the Lewis River Settlement Agreement. In addition, the February 6, 2017 deadline will be postponed six (6 months) to August 6, 2017 as per the Services request. Both the Services and Utilities will prepare the appropriate extension request letters to the FERC.

Date	Event	Summary
12/8/2016	ACC In Lieu Meeting	Review Draft Habitat / Species Tables from Mike Bonoff. Discuss Next Steps in the Alternative Evaluation Process. Identify Information Needs for December 16, 2016 Meeting. Toby Kock, USGS - New Information; In Lieu Presentation & Discussion
1/3/2017	EOT to FERC	On January 3, 2017, PacifiCorp submitted an EOT request proposing a new decision date for the Services of August 24, 2017. On February 9, 2017, the FERC issued the requested EOT.
1/3/2017	FERC EOT Request	On December 8, 2016, the Services notified the ACC that while significant progress has been made with the workgroup, it has become apparent that the decision process cannot be completed within the timeframe identified in the Lewis River Settlement Agreement (decision to be made no later than February 24, 2017). Additional time (six months) is expected for the Services and workgroup to complete their tasks and then as needed, allow the Services to conduct government-to-government consultation with the Cowlitz Indian Tribe and Yakama Nation. It is with the full support of the workgroup and Services (see Attachments C and D) that the Utilities request the Commission provide an extension of time until August 24, 2017 for the Services to issue their formal decision. With this revised schedule, the Utilities will also conduct a meeting with the ACC in June 2017 for the purpose of discussing the new information and comments. Before August 24, 2017, Utilities will solicit and obtain the Services' response to the new information and related comments, unless the Services have already provided the results of their review to the ACC.
1/19/2017	ACC In Lieu Meeting	Review process involving EDT Technical Working Group and Matrix Approach since our last meeting. Review Assumptions and Data in the Evaluation Criteria Matrices Ensure all are comfortable with Matrix approach Ensure all are comfortable with Assumptions and Data Review each Alternative Which is preferred based from a biological / technical perspective?
2/2/2017	ACC In Lieu Meeting	Review EDT Modeling (including that requested by Ruth) Revisit recommendation of preferred alternative Review of Deliverable from this group What all should be included? EDT analyses Bull trout Predation in Merwin? Ecological interactions / marine -derived nutrients? Other? Discuss how and timeline to collect additional data to complete deliverable Set final meeting date where the Deliverable (Science-based document) will be reviewed and finalized.
2/9/2017	ACC Meeting	The Workgroup met February 3, 2017 and they still want to wrap up the science. Mike Bonoff (MB&G) will summarize the science information and submit this detail to the ACC. The next scheduled meeting is February 22, 2017.
2/22/2017	ACC In Lieu Meeting	Review of Kevin Malone's updated EDT memo, Jeremiah Doyle (PacifiCorp) Bull Trout Information, and Beauchamp's report, Poll each organization on its recommended alternative from purely a science perspective. Discussion of how these preferences will be accounted for in the science based recommendation document that is ultimately provided to the Services. Discuss next steps.
3/1/2017		Cowlitz Tribe provided a position paper. http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/Final_Decision_Support_July_28_2017%20(website).pdf (Appendix A)

Date	Event	Summary
3/17/2017	ACC In Lieu Meeting	Review and discussion of Action Items: Recommendation summaries from each entity Yale Salmon and Steelhead Reintroduction Implementation and Adaptive Management Strategy. Poll each organization on its recommended alternative from purely a science perspective. Discussion of how these preferences will be accounted for in the science based recommendation document that is ultimately provided to the Services. Discuss next steps Current thoughts on alternatives: LCFRB: Alternative 1b - Yale: D/S & U/S; Adults into Yale & adults into Swift (volitional only) with $19 million for habitat with adaptive management / M&E strategy WDFW: Alternative 1b - Yale: D/S & U/S; Adults into Yale & adults into Swift (volitional only) with $19 million for habitat adaptive management / M&E strategy Cowlitz PUD: Alternative 3 - Passage at neither with $37.95 million for habitat PacifiCorp: Alternative 3 - Passage at neither with $37.95 million for habitat Cowlitz Tribe: Alternative 2 – Full passage at both reservoirs USFS: Alternative 1b - Yale: D/S & U/S; Adults into Yale & adults into Swift (volitional only) with $19 million for habitat adaptive management / M&E strategy.
5/1/2017		For the period of May 2017 through March 2018, PacifiCorp conducted individual meetings with certain ACC member organizations.
5/11/2017	ACC In Lieu Meeting	Review and discussion of Draft Outline for Decision Support Document: Explanation of what would be included in each section Feedback / Suggested changes Review Alternative 1b plus M&E / Adaptive Management Approach Walk through concept paper Any show stoppers? Potential unintended consequences? Pros and Cons of this approach Services: Is this concept sufficiently descriptive for your purposes? Discuss next steps: Timeframe and Process for Document Review Other opportunities for engagement? When would the decision be made? Eli Asher (Cowlitz Indian Tribe) asked all to remember that the Cowlitz Tribe's reading of the Settlement Agreement (SA) is asking whether full introduction is inappropriate and if so, the proper way to proceed. Eli reiterated that the SA says if any party brings new information indicating that reintroduction is inappropriate, then alternative approaches should be discussed. If the Services deem that reintroduction is indeed inappropriate, then the option of the in-lieu fund should be considered. The Cowlitz Tribe believes that reintroduction is appropriate. They do not see that a fatal flaw has been exposed regarding reintroduction. Asher will send Bonoff his edits under 2.3 of the outline for the Decision Support Document as the Tribe has "heartburn" over the November 2016 handout, particularly use of the USGS assumptions that predation would shift from kokanee to coho. They agree that predation is an issue in Merwin; however, the Tribe doesn't believe Pike Minnow predation in Merwin qualifies as "new information." It was agreeded that the Tribe (or any other party) could submit a contradictory paper to this effect after the fact. Eli is concerned about the adaptive management piece and the what-ifs with respect to bull trout interaction. Eli stated he finds the fish squeezing (M&E portions) to be comprehensive. The background makes a lot of sense. He doubted the downstream migration (passive, in a net, in a lake) would be effective.
6/8/2017	ACC Meeting	Consensus among the Science Workgroup was not reached. The draft decision support document is with the Science Workgroup for a 30-day review period; comments are due June 23, 2017.

Date	Event	Summary
7/13/2017	ACC Meeting	In Lieu Process Update – Mike Bonoff (MB&G) informed the ACC the In Lieu Decision Support Document process began in September 2016 by a Working Group of the ACC to provide recommendations to the USFWS & NMFS (Services) regarding consideration of future fish passage and in-lieu alternatives though the Lewis River project. The Working Group met eleven times in 2016 and a subsequent Core Work Group (science group) representatives met for three additional meetings in 2017. While a consensus recommendation was not received the consultation process was thoughtful and good recommendations based on foundational science were provided to the Services for their consideration. The decision support document was emailed to the Working Group and Core Work Group June 2, 2017 for a 3-week review and comment period. A final draft decision support document was emailed to the ACC June 28, 2017 for review and comment due July 13, 2017. PacifiCorp has a phone call into NMFS (Michelle Day) to discuss the number of months that the Services may need from the FERC before the Services can render its decision. PacifiCorp wishes to submit an extension of time request letter to the FERC no later than July 31, 2017. Day expressed that she and Mark Celedonia (USFWS) are discussing the time frame needed and will get back to PacifiCorp. PacifiCorp only needs an estimate of additional time needed from the Services in order to move forward with the FERC extension. Pat Frazier (WDFW) noted that they have a few comments on the decision support document and will provide them to PacifiCorp no later than close of business July 19, 2017. MB&G will then finalize the document week of July 24, 2017. Final Document - http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/li/acc/Final_Decision_Support_July_28_2017%20(website).pdf
8/4/2017	EOT to FERC	On August 4, 2017 a second extension of time request was submitted on behalf of the Services proposing a decision date of no later than February 23, 2018.
8/4/2017	FERC EOT Request	On December 8, 2016, the Services notified the ACC that while significant progress had been made with the science workgroup on fish passage issues, it was apparent that the agency decision process could not be completed within the timeframe identified in the Lewis River Settlement Agreement (decision to be made no later than February 24, 2017). Additional time would be needed to allow the Services to consider available information, and conduct government-to-government consultation with the Cowlitz Indian Tribe and Yakama Nation. Based on this correspondence, on January 3, 2017, PacifiCorp filed an extension of time request with the Commission, identifying a new decision date of August 24, 2017………………..As identified in PacifiCorp's January 3, 2017, extension of time request, both the Services and the ACC agree that with a delay in decision-making, the schedule for any future Lewis River fish passage facility design, permitting and construction should be commensurately extended to the Utilities. While such a consideration was not acted upon by the Commission in their February 9, 2017, order granting extension of time, the Utilities respectively identify this concern and may be making subsequent extension of time requests to the Commission to complete any requisite fish passage facilities following the Services formal decision. It is with the full support of the Services (see Attachments D and E) that the Utilities request the Commission provide an extension of time until February 23, 2018 for the Services to issue their decision regarding additional fish passage at the Lewis River hydroelectric project. With this revised schedule, the Utilities will work with the Services to provide the ACC with periodic updates on progress towards the formal decision.
9/12/2017	FERC issued EOT	On September 12, 2017, FERC issued the requested EOT. On January 30, 2018, the Services determined six months of additional time was needed to make their decision. The Services then requested PacifiCorp submit an EOT request to the FERC.
9/14/2017	ACC Meeting	PacifiCorp will be requesting a status from the Services regarding their next steps. The FERC granted the extension to the Services until February 23, 2018 to file their determination for fish passage facilities at Yale and Merwin reservoirs.
10/12/2017	ACC Meeting	Michelle Day (NMFS) expressed that NMFS and USFWS need to initiate the government to government. Day expressed that this is a big issue on their plate and February 2018 still remains the target, however, she cannot confirm at this time if NMFS and USFWS can meet this date.

Date	Event	Summary
11/9/2017	ACC Meeting	PacifiCorp communicated to the ACC that USFWS is working with PacifiCorp to go back out to conduct an additional redd survey. The USFWS pointed out that Cougar Creek length was over estimated. MB&G, consultant for PacifiCorp, will rerun the model and stocks into Yale. A technical memorandum will be emailed to the ACC that amends the EDT model. The memorandum will also be added to the Lewis River website. Michelle Day (NMFS) informed the ACC attendees that NMFS' higher-ups will initiate the communication with the Tribes (government to government). February 23, 2018 is the current FERC deadline for the Services to render a decision. Jim Malinowski (Fish First) expressed that on behalf of Fish First he will submit comments to the Services within the next couple of weeks. Malinowski further stated that Fish First opposes reintroduction into Merwin & Yale. Fish First wants significant funds spent on a basin-wide nutrient enhancement program.
12/14/2017	ACC Meeting	On December 8, 2017 PacifiCorp emailed a memorandum, Correction to July 2017 Decision Support Document: Cougar Creek Reach Length/Revised Lewis River EDT Results, from Mike Bonoff, Meridian Environmental (Attachment B). This memo is in response to a question by Mark Celedonia (NMFS) regarding available habitat in Cougar Creek. Based on Celedonia's review, Cougar Creek habitat was corrected from approximately 3 miles to 1.6 miles and the EDT model was re-run based on that correction. Michelle Day (NMFS) informed the ACC attendees that NMFS' is moving forward with the Tribes to begin government to government discussions. NMFS' tribal liaison will set up the meetings.
1/11/2018	ACC Meeting	Michelle Day (NMFS) informed the ACC attendees that NMFS' is moving forward with the Tribes and may begin government to government discussions as early as this month. Day further approved PacifiCorp to proceed with creating a draft FERC extension request for six (6) months for NMFS' review and approval.
2/8/2018	ACC Meeting	PacifiCorp informed the ACC that the Services have requested PacifiCorp submit an extension of time request (6 months until August 23, 2018) to the FERC on their behalf. PacifiCorp expects to file the FERC extension request letter this week or early next week.
2/15/2018	FERC EOT Request	It is with the full support of the Services (see Attachments A and B) that the Utilities request the Commission provide an extension of time until August 23, 2018 for the Services to issue their decision regarding additional fish passage at the Lewis River hydroelectric projects, and for the Utilities to file the Services' determination with the Commission in accordance with settlement agreement section 4.1.9(d). With this revised schedule, the Utilities will work with the Services to provide the Lewis River Aquatic Coordination Committee (ACC) with periodic updates on progress towards the formal decision.
3/8/2018	ACC Meeting	Tim Romanski (USFWS) informed the ACC attendees that the Services met with the Cowlitz Indian Tribe and PacifiCorp approximately one month ago. The Services will be seeking meetings with the Cowlitz Indian Tribe and the Yakama Nation towards meeting the August 2018 decision deadline. Eli Asher (Cowlitz Indian Tribe) asked that Olson identify work that PacifiCorp had taken, most notably with people in Washington DC. Olson shared that PacifiCorp favors a partnership with the National Fish & Wildlife Foundation; it can bring benefits and increase the scope of habitat restoration. Individual meetings at various organization levels have been held with certain agencies and both tribes. ACC representatives would like to hear more about the Foundation and implementation of the full in-lieu fund alternative. This topic was added to the April ACC agenda.
4/3/2018	FERC issued EOT	The Services' new notice of decision date would be no later than August 23, 2018. PacifiCorp filed the request to the Commission on February 15, 2018. On April 3, 2018, FERC issued the requested EOT, making the new deadline for the Services' decision August 23, 2018.
4/12/2018	ACC Meeting	Lewis River In-Lieu Update Presentation – National Fish and Wildlife Foundation (NFWF) Jonathan Birdsong, Director – Western Region (NFWF) provided a PowerPoint presentation (see Attachment C for greater detail) to inform the ACC of the background of NFWF. NFWF leverages public and private dollars for on-the-ground conservation projects through grant making and consists of a plethora of federal, corporate, timber companies, Utilities and foundation partners. NFWFs goal with each project is to sustain, restore and enhance the nation's natural heritage, to bring collaboration among federal agencies and the private sector, to create common ground among diverse interests restore instream flows and to benefit habitat. Birdsong noted one of the many key components is the science and evaluation provided for each project.
6/14/2018	ACC Meeting	Tim Romanski (USFWS) informed the ACC attendees that personnel from USFWS and NMFS (Services) met with the Tribes on more than one occasion. The Services will brief their agency heads and are working toward a decision prior to the August 23, 2018 deadline. On official dual letterhead, the Services will notify the FERC and the ACC of its decision.

Date	Event	Summary
7/12/2018	ACC Meeting	Tim Romanski (USFWS) informed the ACC attendees that he will be meeting with the Yakama Nation next week and they have met a couple of times with the Cowlitz Indian Tribe. Romanski also communicated that he wanted the ACC to have a copy of the three University of Washington publications related to northern pikeminnow predation impacts and prey supply and consumption demand of resident fishes. Romanski requested PacifiCorp distribute the documents via email to the ACC on behalf of USFWS. Romanski indicated that the intent of the Services is to meet the August 23, 2018 deadline.
8/9/2018	ACC Meeting	Eli Asher (Cowlitz Indian Tribe) shared his concerns to the ACC regarding conflicting information he discovered between the USGS New Information Study and the University of Washington Sorel published papers and Master's thesis. Asher indicated that the USGS study did not credit Sorel and that the USGS report interprets results differently and either omits or contradicts portions of the conclusions made by the Sorel paper. Asher asked why during the In Lieu process a paper (i.e., USGS report) was provided to the ACC reporting different discussions and conclusions than the Sorel papers and thesis. Asher provided Lesko written copies of both reports identifying specific changes and comments by Asher. Asher and the ACC attendees requested Dr. Al- Chokhachy (USGS) address the ACC about discrepancies or whether the Services are already digging into the matter. Rudy Salakory (Cowlitz Indian Tribe) expressed that he would like to see a narrative developed to re-establish trust and how this discrepancy came to be. Lesko informed the ACC that he will discuss with Todd Olson (PacifiCorp) regarding the ACC request and concerns expressed by Asher and Salakory (including the written comments provided by Asher).
8/22/2018	FERC EOT Request	PacifiCorp, the Services, and other settlement parties are currently engaged in discussions and actions related to Lewis River Settlement Agreement section 4.1.9 (Review of New Information Regarding Fish Transport into Lake Merwin and Yale Lake). However, additional time is needed for PacifiCorp and the Services to coordinate with other settlement parties regarding these matters. The Services also need to respond to recent Government to Government requests by one or more Tribes. Accordingly, the Utilities request an additional 45-day extension of time, until October 8, 2018. The Utilities have communicated with the Services, and understand the Services support this request (see Attachments A and B).
9/13/2018	ACC Meeting	Josh Ashline (NMFS) informed the ACC attendees that the Services requested a 45-day extension to October 8, 2018. Ashline communicated that the Services have engaged or will engage soon with all interested parties (e.g., WDFW, PacifiCorp, Forest Service, and Cowlitz Tribe). Ashline further stated that any other ACC representatives wishing to schedule a meeting with the Services regarding the in lieu decision to please reach out to him. Erik Lesko (PacifiCorp) informed the ACC that after discussion with the Services Dr. Al- Chokhachy (USGS) would not be asked to address the ACC about the Sorel thesis and USGS report discrepancies (a request the ACC made of PacifiCorp at the previous ACC meeting). Rather PacifiCorp preferred that members of the ACC speak directly with the Services about this matter. Ashline indicated that the Services are aware of the USGS discrepancy and they are basing their decision(s) off of both documents. During scientific review, the Services are evaluating each paper individually. In response to further discussion, Ashline said that he does not see any reason why NMFS cannot reach out to USGS and Sorel to discuss comparing the two documents to aid in their evaluation. The ACC requested Eli Asher (Cowlitz Tribe) email them his comments on the Sorel thesis predations excerpts compared with the USGS report.
10/11/2018	ACC Meeting	PacifiCorp informed the ACC attendees that the Services requested a 14-day extension to October 23, 2018.
11/8/2018	ACC Meeting	PacifiCorp informed the ACC attendees that the Services requested an additional extension from the FERC to December 4, 2018.
11/30/2018	FERC EOT Request	PacifiCorp, the Services, and other settlement parties remain engaged related to Lewis River Settlement Agreement section 4.1.9 (Review of New Information Regarding Fish Transport into Lake Merwin and Yale Lake). However, additional time is needed by the Services regarding these matters. Accordingly, the Utilities request an additional extension of time, until January 18, 2019. At this point, we believe it unlikely that additional extensions will be required by the parties. The Services support this request (see Attachments A and B).
12/13/2018	ACC Meeting	PacifiCorp informed the ACC attendees that on November 30, 2018 the Services requested an additional extension from the FERC to January 18, 2019. McCune (PacifiCorp) noted that the FERC formally approved the extension. In addition, NMFS requested PacifiCorp distribute a letter from USGS explaining that their report titled "Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River" is going through the Fundamental Science Practices (FSP) process and they anticipate completion before mid- December 2018, see Attachment B.
1/10/2019	ACC Meeting	PacifiCorp informed the ACC attendees that due to the government shutdown PacifiCorp contacted the Services on January 8, 2019 and proposed an additional extension of time until March 1, 2019. McCune noted that the extension of time letter to the FERC will be filed today.
1/10/2019	EOT to FERC	Request for extension of time to 3/1/2019 due to federal shutdown

Date	Event	Summary
1/10/2019	FERC EOT Request	In view of the federal government shutdown, PacifiCorp contacted the Services on January 8, 2019, and proposed an additional extension of time, until March 1, 2019, to enable the Services to complete their decision processes, assuming the federal government shutdown ceases in the next few weeks. No objections to this proposed extension of time were received. The Utilities therefore request that the Commission grant an additional extension of time, until *March 1, 2019* , in view of the current federal shutdown. In the event the federal shutdown continues past the end of January, 2019, the Utilities may request an additional extension of time.
2/14/2019	ACC Meeting	Josh Ashline (NMFS) communicated that the In Lieu decision is expected by March 1, 2019 and the Services are prepared to make a decision by that time.
3/1/2019	FERC EOT Request	In view of delays caused by the federal government shutdown, and to enable the Services to complete their decision process, the Utilities request that the Commission grant an additional extension of time, until *March 15, 2019* . The Services are aware of this request and support the extension of time.
3/14/2019	ACC Meeting	Josh Ashline (NMFS) informed the ACC that the Services asked for an extension to March 15,2019 for a decision. Eli Asher (Cowlitz Indian Tribe) expressed that the Tribe filed a motion to intervene on March 11, 2019 and informed the other ACC attendees that they too can file a post license motion to intervene.
3/15/2019	FERC EOT Request	By way of background, on March 1, 2019, the Utilities notified the Commission of the need for an extension of time until March 15, 2019, in view of delays caused by the federal government shutdown, and to enable the Services to complete their decision process. The Services now request through this filing that the Commission grant an additional extension of time, until April 12, 2019.
4/11/2019	ACC Meeting	Josh Ashline (NMFS) communicated via email on April 10, 2019 that the in-lieu decision continues to be evaluated by headquarters staff, and we anticipate a timely decision (by April 12, 2019) on their part.
4/11,12/2019	Services issued preliminary decisions	National Marine Fisheries Service and US Fish & Wildlife Service (USFWS) (collectively the “Services”) issued preliminary decisions regarding construction of anadromous fish passage facilities at the Merwin and Yale hydroelectric projects located on the Lewis River. Current anadromous fish passage is provided between Merwin dam and upstream of Swift dam. The Services preliminary decision is to forego construction of anadromous fish passage into Merwin reservoir and establish a Merwin In-Lieu Fund of approximately $20,000,000, and postpone a decision until 2031 in regards to downstream fish passage measures in Yale reservoir and until 2035 regarding Yale upstream fish passage measures. For the USFWS, the preliminary decision also requires the construction of smaller magnitude bull trout fish passage measures for connectivity between Merwin, Yale and Swift reservoirs.
5/9/2019	ACC Meeting	Utilities and representatives of the Services met with the Lewis River Aquatic Coordination Committee (ACC) to explain the Services’ preliminary decision and outline the steps the Utilities will take through the remainder of 2019 to prepare a license amendment application to the Commission. The application will be consistent with the Services’ preliminary decision to forego construction of anadromous fish passage into Merwin reservoir and establish an In-Lieu Fund of approximately $20,000,000, and postpone a decision until 2031 in regards to downstream fish passage measures in Yale reservoir and until 2035 regarding Yale upstream fish passage measures. In addition, and per USFWS direction, the Utilities will construct certain fish passage facilities for Bull Trout, a federally listed species.
6/7/2019	Notice of Dispute	Pursuant to Section 15.10 of the Lewis River Settlement Agreement The Cowlitz Indian Tribe, The Native Fish Society, Trout Unlimited and American Rivers filed a Notice of Dispute concerning fish passage determinations and implementation, with the FERC, the Utilities, NMFS and USFWS.
6/10/2019	Notice of Dispute	Lower Columbia Fish Recovery Board filed Notice of Dispute and notice that they are joining the dispute previously filed by the Cowlitz Indian Tribe on June 7, 2019. The dispute was filed with the FERC, the Utilities, NMFS and USFWS.
6/13/2019	ACC Meeting	PacifiCorp provided the ACC with a project and ADR status update.
6/28/2019	2019 Q2 update to FERC	Utilities filed its 2019 Q2 Fish Passage Determinations and In Lieu Program Fund Quarterly Report.
7/8/2019	Notice of Dispute	Washington Department of Fish and Wildlife Service filed Notice of dispute and notice that they are joining the dispute previously filed by the Cowlitz Indian Tribe on June 7, 2019. The dispute was filed with the FERC, the Utilities, NMFS and USFWS.
7/11/2019	ACC Meeting	PacifiCorp provided an updated In-Lieu review schedule for ACC review.
8/1/2019	Draft Plans provided to ACC for 30 day review	Draft Lewis River Basin Implementation Monitoring Plan, Draft Lewis River Merwin In-Lieu Program Strategic Plan, and Draft Lewis River Bull Trout Fish Passage Plan were emailed to the ACC for a 30-day review and comment period.

Date	Event	Summary
8/8/2019	ACC Meeting	Mike Bonoff (Meridian Environmental) provided a PowerPoint presentation to the ACC attendees to review the Draft Lewis River Merwin In-Lieu Program Strategic Plan that was emailed to the ACC for a 30-day review and comment period August 1, 2019.
8/13/2019	Notice of Dispute Resolution Meeting to SA Parties	The Utilities sent notice of an informal dispute resolution meeting pursuant to Section 16.6 of the Lewis River Settlement Agreement.
8/14/2019	Notice of Dispute Resolution Meeting to FERC	The Utilities sent notice to FERC of an informal dispute resolution meeting pursuant to Section 16.6 of the Lewis River Settlement Agreement.
8/26/2019	USFS Rsp to Request for 30 day Review	Letter response from U.S. Forest Service (USFS) regarding PacifiCorp's request for 30-day review of the draft Lewis River Implementation Monitoring Plan, Merwin In-Lieu Strategic Plan and Bull Trout Passage Concepts. USFS did not comment due to ongoing ADR process.
8/29/2019	WDFW Rsp to Request for 30 day Review	Letter response from Washington Department of Fish and Wildlife (WDFW) regarding PacifiCorp's request for 30-day review of the draft Lewis River Implementation Monitoring Plan, Merwin In-Lieu Strategic Plan and Bull Trout Passage Concepts. WDFW did not comment due to ongoing ADR process.
8/30/2019	LCFRB Rsp to Request for 30 day Review	Email response from the Lower Columbia Fish Recovery Board (LCFRB) regarding PacifiCorp's request for 30-day review of the draft Lewis River Implementation Monitoring Plan, Merwin In-Lieu Strategic Plan and Bull Trout Passage Concepts. LCFRB did not comment due to ongoing ADR process.
8/30/2019	Trout Unlimited Rsp to Request for 30 day Review	Email response from the Trout Unlimited regarding PacifiCorp's request for 30-day review of the draft Lewis River Implementation Monitoring Plan, Merwin In-Lieu Strategic Plan and Bull Trout Passage Concepts. Trout Unlimited did not comment due to ongoing ADR process.
8/30/2019	Cowlitz Indian Tribe Rsp to Request for 30 day Review	Email response from the Cowlitz Indian Tribe regarding PacifiCorp's request for 30-day review of the draft Lewis River Implementation Monitoring Plan, Merwin In-Lieu Strategic Plan and Bull Trout Passage Concepts. The Tribe did not comment due to ongoing ADR process.
9/12/2019	ACC Meeting	PacifiCorp informed the ACC attendees that prior to the end of the 30-day comment period of the Merwin In-Lieu Strategic Plan, Monitoring Plan and Bull Trout Fish Passage Plan, the following entities submitted letters/emails to the Utilities – CIT, LCFRB, WDFW, Trout Unlimited and USFS.
9/13/2019	Notice of Dispute Resolution Meeting	Utilities provide letter notice of a dispute resolution meeting, pursuant to section 16.6 of the Settlement Agreement, scheduled for September 19, 2019.
9/25/2019	NMFS Rsp to Request for 30 day Review	NMFS submitted comments in response to PacifiCorp's request for 30-day review of the draft Lewis River Implementation Monitoring Plan, Merwin In-Lieu Strategic Plan and Bull Trout Fish Passage Plan.
9/30/2019	2019 Q3 update to FERC	Utilities filed its 2019 Q3 Fish Passage Determinations and In Lieu Program Fund Quarterly Report.
10/10/2019	ACC Meeting	Cowlitz PUD provided the following update as provided by Olson via email: On September 30, PacifiCorp provided a report to FERC noting that an ADR meeting was conducted on September 19th, and that many of the ACC representatives attended. NMFS is now scheduling follow-up meetings discussed at the September 19 meeting. The Utilities are revising the Action Documents (Strategic, Monitoring and bull trout passage plan) and preparing the draft license amendment application to FERC. Per the Utilities prior filings with FERC, we are working towards updating these documents for submittal to FERC.
11/19/2019	ACC Meeting	PacifiCorp informed the ACC attendees that PacifiCorp is in the process of updating the draft monitoring and strategic plans which will include a comment and response matrix. The tentative schedule for the next round of ACC review is early December 2019. Length of ACC review period is yet to be determined. PacifiCorp responded to a question indicating they had not decided if the ACC review would be the 30 day review of the strategy, monitoring plan and bull trout passage design or the 90 day signatory review for the license amendment and attachments including the aforementioned documents.
12/12/2019	ACC Meeting	Josh Ashline (NMFS) communicated to the ACC that their response to parties is going through legal review now and will be distributed to the ACC upon final approval from NMFS.
12/30/2019	2019 Q4 Update to FERC	Utilities filed its 2019 Q4 Fish Passage Determinations and In Lieu Program Fund Quarterly Report.
1/9/2020	ACC Meeting	No update provided by the Services this month regarding the ADR process. PacifiCorp is assembling draft applications for License amendments in preparation for a filing with the FERC. The draft applications will be released within the next two weeks for 90-day review and comment period.
2/5/2020	Applications for Non-capacity Amendments	Utilities distributed draft applications for non-capacity FERC license amendments for the Merwin, Yale, Swift No. 1 and Swift No. 2 Projects to all Settlement Agreement Parties and ACC Representatives for 90 day review.
2/13/2020	ACC Meeting	PacifiCorp informed the ACC attendees that the Utilities have assembled draft applications for License amendments, posted them to PacifiCorp’s website and mailed copies to the SA parties on February 5, 2020 for a 90-day review period (by May 13, 2020).

Date	Event	Summary
3/2/2020	Request for Formal Dispute Mediator	Disputing Parties (Cowlitz Indian Tribe, Native Fish Society, American Rivers, Trout Unlimited, Washington Department of Fish and Wildlife, and the Lower Columbia Fish Recovery Board) request a formal mediator be employed for dispute resolution.
3/12/2020	ACC Meeting	Discussion about ACC approval of In Lieu Plans; In response to the discussion, the Utilities committed to developing a specific decision process that aligns with today's earlier discussion on ACC Standards and Guidelines. While it was understood that ACC members might not have substantive comments on the draft plans until May, the April ACC meeting should have time on the agenda to review the decision process and discuss the draft plans.
3/30/2020	2020 Q1 Update to FERC	Utilities filed its 2020 Q1 Fish Passage Determinations and In Lieu Program Fund Quarterly Report.
3/30/2020	NMFS Rsp to Request for Formal Dispute Mediator	NMFS identifies it's considerations for mediated ADR and suggests that futher dispute resolution may be better suited to a time when the Services are closer to a final decision.
3/31/2020	Letter to NMFS and USFWS Regarding Formal Dispute Resolution	Utilities responded by letter to U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) stating that they do not support the request for a formal mediator as requested by the disputing partied in their March 2, 2020 letter.
4/9/2020	ACC Meeting	Disscussion about proposed ACC approval process. The ACC requested that the Services provide guidance to the ACC about the Services expectations for when ACC review and approval of the documents should occur. Utilities suggested that the Services should clarify or define the expectation for 'approval' by the ACC. The ACC also noted the need to revise the ACC Structure and Ground Rules document to include a decision making template. Josh Ashline (NMFS) and Tim Romanski (USFWS) indicated they would each consult with their respective agencies to clarify the Services' expectations for ACC review of the documents.
5/13 -15/2020	Parties to the Lewis River Settlement Agreement provide comments to Utilities on Draft Applications for FERC License Amendments	See Exhibit E Appendix - Consultation Record - Comment/Response Matrix
5/14/2020	ACC Meeting	In response to the April ACC request to the Services, the ACC and Services discussed the Services expectation of the ACC. The Services requested the ACC go through a consent decision process as outlined in the Lewis River Settlement Agreement section 14.2.4.b. Timing of such request was not specifically defined, and the Services noted they are developing a timeline for remaining project actions. They will share the timeline with the ACC once it is available.
6/2/2020	Cowlitz Indian Tribe, Native Fish Society, American Rivers, Trout Unlimited, the Washington Department of Fish and Wildlife and the Lower Columbia Fish Recovery Board Letter to NMFS, USFWS and Utilities.	Response to March 30, 2020 letter from B. Thom, NMFS. This letter states that if NMFS is unwilling to participate in mediated ADR regarding this dispute, then the Disputing Parties agree with the NMFS's conclusion as stated in its March 30, 2020 letter that the ADR process has been completed pursuant to Section 15.10 of the Settlement Agreement.
6/10/2020	ACC Meeting	Discussion about ACC Consensus Process regarding the Merwin In Lieu Strategic Plan, Lewis River Basin Implementation Monitoring Plan, and Bull Trout Fish Passage Plan. Topic was in response to NMFS request of May 2020 ACC meeting. The ACC agreed to a consensus kickoff meeting whereby the Utilities and their consultants will present the generalized comments received on the draft applications and identify how comments were addressed. The meeting schedule largely depends on the Services timeline.

AUTHORIZED REPRESENTATIVES OF SETTLEMENT AGREEMENT PARTIES
and
CONSULTATION PARTIES UNDER 18 C.F. R. § 4.38(a)(7)

Settlement Agreement Party	**Authorized Representatives**	**Contact Information**
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* Denotes consultation party for purposes of 18 C.F. R. § 4.38(a)(7).

Responses to Comments Received on Draft Lewis River License Amendment Applications

Commenter	Comment Number	Comment	Response
NMFS	1	No mention of pikeminnow or resident rainbow trout	Comment noted. Northern pikeminnow and resident rainbow trout have been added to the list of fish identified in E.4.1.1 Fish Resources.
NMFS	2	This is the first introduction of noise effects to fish, while turbidity effects were discussed in previous sections	Text has been added to Exhibit E section 4.0.1.2 identifying noise as a short-term temporary effect of proposed action.
NMFS	3	Are there in-water-work-window differences for tributaries and reservoirs? IWWW are established during times fish are least likely to be present and I doubt this is the same time for lentic and lotic systems.	The in-water work window, as defined by Washington Department of Fish and Wildlife, for the North Fork Lewis River and tributaries from Merwin Dam to Lower Falls is July 16 to August 15; and upstream of Lower Falls is July 15 through February 28. These in-water work windows have not been formally approved by the National Marine Fisheries Service or U.S. Fish and Wildlife Service.
NMFS	4	Discussion of the delayed Yale decision for passage or habitat restoration falls into this section. Is ten years really a short term impact? I would define the difference between short-term and long-term impacts earlier in the document.	Comment noted. The Utilities have updated Exhibit E to more clearly define the distinction between short term effects (i.e. those temporary effects associated with implementing the proposed actions) and long term effects (i.e. those that persist beyond the implementation of the project actions).
NMFS	5	Did the 2006 FEIS evaluate different passage scenarios, and in-lieu outcomes? Does the Merwin In-Lieu program perpetuate (as inferred) or alter the 2006 FEIS evaluation with respect to fish runs being managed by people?	Yes. The 2006 FEIS contemplated that PacifiCorp would contribute to an in lieu fund in the event that fish passage facilities were not constructed, per the Settlement Agreement. FEIS 2.1.3.7 indicated that the In Lieu Fund would be used for mitigation measures that would meet the objective of achieving equivalent or greater benefits to anadromous fish populations as would have occurred if fish passage had been provided. The 2006 FEIS stated such measures could improve fish passage in tributary streams by constructing fishways, dam removal, or culvert repair/improvements, and habitat enhancement measures such as streambank protection and stabilization, minimizing sediment input, and maintaining/enhancing large woody debris (LWD) structures.
NMFS	6	The inclusion of all the steps and documents necessary for the services to reach a final determination should be included in that discussion. Including but not limited to; fish passage prescriptions, BiOp, and NEPA.	The Utilities anticipate that the Services will finalize their determinations regarding fish passage as part of the Projects' non-capacity license amendment process. During this process, FERC will consult with the Services under Section 7 of the Endangered Species Act. On June 6, 2019, FERC designated the Utilities as its non-federal representatives for the purposes of conducting informal consultation pursuant to 50 CFR § 402.08. The Utilities are preparing a draft Biological Evaluation for FERC to utilize in initiating formal consultation with the Services. Additionally, as applicant, the Utilities are preparing an Enviornmental Assessment for FERC to utilize in compliance with NEPA. It is anticipated that the Services will make their final determination regarding fish passage following formal consultation with FERC and prior to issuing biological opinions relating to the non-capacity license amendments. Because Sections 4.1.9 and 4.5 through 4.8 of the Settlement Agreement contemplate that the Services may direct changes to the nature and timing of the Utilities' requirements to construct fish passage facilities no amendments to the Settlement Agreement are required.
NMFS	7	Why are the Services the final decision makers with respect to projects that have even ranking? Is this a SA provision? Wouldn't it be better for the ACC to vote on projects that rank out evenly to break ties? Or via TAC recommendation?	The Services possess the requisite degree of expertise and experience to make these determinations. The Utilities believe consolidating the decision making with respect to ranking will help expedite the restoration projects.
NMFS	8	It would be valuable to include a list of some potential contractors to implement in-lieu restoration projects. Currently we struggle to award aquatic fund monies, and I worry this process will have similar disappointing results.	Utilities intend to maintain a stable of experts for both design and construction of habitat improvement projects; list to be vetted through the ACC. Utilities will ensure contractors are qualified and identify the contractors in the periodic reports to the ACC.
NMFS	9	With respect to dewatering and fish relocation, I'm quite sure a certified Fish Bio from the state will need to be present during these actions, and they cannot be solely undertaken by the contractor.	A qualified biologist will be on site for any needed dewatering and fish salvage, per requirements of PacifiCorp's HPA or other permits.
NMFS	10	I'm hopeful that all annual reporting will be done on an individual project basis. At a minimum ensuring all reporting clearly define Utility funded projects and "matching" funded projects.	Reporting will be done on individual projects as they are defined in the Habitat Restoration Plan.
NMFS	11	Again, include all the steps necessary for the preliminary decision to become final	See response to NMFS comment #6
NMFS	12	There are elements of the Strategic Plan ("matching funds" and project implementation in the lower river/Mainstem Columbia) that do not fit the overarching goal set forth in the SA that specifically states "above Merwin Dam". It would be highly beneficial within the Strategic Plan to clearly state why the PA will be seeking matching funds to spend in the lower river/Columbia when that doesn't sync with the Habitat Restoration Goals and Monitoring Objectives section of the Monitoring Plan, and are outside the Reintroduction Outcome Goal described in the SA.	Consistent with regional recovery goals, matching funds contributed by others will be unrestricted and available for enhancement projects elsewhere in the Lewis River Basin, including reaches downstream of Merwin and in the mainstem Columbia River. This availability will encourage coordination and cooperation on large scale projects in the lower Columbia River mainstem and estuary.

NMFS	13	In the last question of the section. It would be good to define which EDT run you will used to evaluation the restoration and habitat improvements.	Monitoring Plan has been updated to include reference to EDT model run used in evaluation.
NMFS	14	Tables 6 and 7. Why is 2019 data omitted from the analysis and these tables?	Data was not available at the time the February 2020 version of the Monitoring Plan was prepared. The referred to tables in the Monitoring Plan have been updated with 2019 data.
NMFS	15	No models other than EDT are discussed in this section.	Monitoring plan has been revised to include a discussion of other models in particular the method used in Appendix B of PacifiCorp (2016), which is based on empirical estimates of increases in salmon and steelhead from published studies on restoration effectiveness. This included a Monte Carlo simulation with predicted increases for all In Lieu Restoration which were similar to predictions from the EDT model. These numbers can be compared to those from the reach-scale fish monitoring to confirm whether the restoration is leading to expected increases and reported in other studies.
NMFS	16	I agree that the high quality data inputs to the EDT model should be collected and used pre and post restoration, under this approach. I would also like to see how the high quality data inputs, compare with the original EDT runs using lower quality best professional judgement data, we relied on for the preliminary decision.	In section 1.4.5 the text indicates that detailed habitat data will be collected in the restored stream reaches before and after restoration. The model outputs can be compared before and after restoration with new habitat data as well as to the previous model runs.
NMFS	17	Agreed that EDT re-runs and genetic mark recapture are the best combination of approaches to detect potential changes in production potential in habitats above Swift reservoir. However, the FSC is vital to the collection of data for the genetic mark recaptures. How will changes in CE throughout the study affect the genetic mark recapture analysis, a random effect in the regression analysis?	The program needs to collect enough juveniles to do the parentage-based estimate smolts per breeder. Because we can control the number of adults released, the required sample sizes for estimating breeder success are likely lower than what we estimate in the tables in the study plan. The collection efficiency will be accounting for in the estimate of smolt production.
NMFS	18	Subsection Genetic Sampling: I think it will be vital to know at a minimum the tributary Adults with genetic material collected are spawning in. This way it can be differentiated between tributary locations that are receiving habitat restoration treatments and those that are not. The results wouldn't be very convincing if only a few spawning pairs are significantly contributing to smolt production and we don't know where they originated from. It would be more compelling to see that tributaries receiving habitat restoration treatments are more successful than those not with respect to smolt production and successful breeders.	The Monitoring Plan has been revised to add sampling adult salmon carcasses or fry in tributaries to help determine the tributaries used by successful spawners. Existing spawner surveys show low carcass recovery rates for some species and tributaries. Therefore, if sufficient samples cannot be collected from carcasses, fry will be sampled in spring or early summer to help determine where successful spawning is occurring.
NMFS	19	Subsection EDT Modeling Before and After Restoration: Also please report the variability in these refined estimates to the original EDT analysis used to inform the preliminary decision.	If we understand comment correctly, it appears the comment is asking the Utilities to report what the difference between the last run of EDT prior to In Lieu, and the post restoration will be. Yes, these predictions from the EDT model run will also be compared to the Malone (2020) EDT model run used to help inform the In Lieu decision. Text has been added to the Monitoring Plan.
NMFS	20	Why is the TAC not included in the list of groups it will be important for the monitoring team to report annual progress to? I thought the TAC was involved in adaptive management?	The Strategic Plan has been revised per comments requesting a more streamlined implementation approach. A Techncial Advisory Committee is no longer required. As identified in section 3.4 of the Plan, reporting will be provided to the ACC, Services and FERC.
NMFS	21	Table 12. The FSC is not operated year round as indicated in the Table. It shuts down seasonally and this should be noted within Table 12.	Table 12 of the Monitoring Plan has been modified to indicate the Swift FSC is not operated year round.
USFWS	1	Bull Trout Passage at Merwin and Yale Reservoirs: The Fish and Wildlife Service sees the purpose of Section 4.10 of the Settlement Agreement as providing bull trout in the Lewis River system the opportunity to express the full range of their life history strategies and provide connectivity between populations absent full salmon passage facilities in Yale and Merwin Reservoirs. All bull trout collection facilities, including the Swift Floating Surface Collector (FSC) have to be efficient and effective at collecting and transporting all life stages of bull trout that could encounter one of the facilities. The Fish and Wildlife Service currently believes that such a protocol would likely utilize the collective experience at the Aquatic Coordination Committee (ACC) and the Lower Columbia River Bull Trout Recovery Team (LRBTRT) to help develop the protocol that would eventually need to be approved by the Fish and Wildlife Service.	Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will engage the ACC per Settlement Agreement requirements and seek the engagement of the LRBTRT in producing the final facility designs and operations plan, and the requisite monitoring studies. Utilities recognize the approval authority of the USFWS.
USFWS	2	All facilities also need to follow the provisions of 4.1.1 through 4.1.3 [of the Settlement Agreement] during the design phase; 4.1.4 for Yale Downstream Facility to achieve relative performance standards; and the Swift and Yale Upstream facilities must be monitored per Section 9 and the Fish and Wildlife Service can require any necessary facilities adjustments and modifications under Section 4.1.6 of the Settlement Agreement.	Utilities agree. Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will follow requirements of the Settement Agreement sections 4.10 and 4.1.1 through 4.1.4. Section 4.10 states "PacifiCorp shall provide for monitoring of performance as provided in Section 9, and make necessary and appropriate Facility Adjustments and Facility Modifications to the Yale and Merwin Downstream Bull Trout Facilities, in Consultation with the ACC and with approval of USFWS, to achieve relevant performance standards as provided in Section 4.1.4 above, provided that such modifications shall not require installation of a different type of passage facility.""PacifiCorp shall follow the provisions in Sections 4.1.1 through 4.1.3 when developing designs for the facilities."

USFWS	3	The draft license amendments lack a thorough alternatives analysis of the three facilities that are being proposed for construction. These facilities should also follow the same process that was used to design and construct the existing upstream facility at the base of Merwin Dam and the existing FSC in the forebay of Swift Reservoir.	During the development of the Bull Trout Passage Plan a number of alternatives for passing fish were considered including different locations for siting the facilities. Upstream passage from the Yale Reservoir considered locations at the Swift No. 2 powerhouse tailrace, locations along the Swift bypass reach and at the upstream-most end of the Swift bypass reach. The locations considered sites that were used to sample bull trout to determine abundance. The final upstream location was selected primarily due to access, relative abundance of bull trout, and the assumption that if bull trout are trying to migrate upstream of this location, this is the furthest point they can access. Fish intending to migrate downstream out of the Yale reservoir would be expected at the downstream end of the Yale reservoir. The Yale dam includes a spillway at the north end and a powerhouse intake at the south end. The spillway includes an exclusion net that can be lowered during high flow events. The powerhouse intake also includes an exclusion net that is permanently anchored in place and does not lower. The site adjacent to the powerhouse intake was selected because it is protected from spill events, can be integrated into the exclusion net, and takes advantage of the outflow from the reservoir that is associated with the powerhouse intake. Upstream passage from Merwin Reservoir considered sites along the long narrow portion of Merwin Reservoir leading up to the Yale powerhouse tailrace which were utilized during previous bull trout sampling events. Like in the Yale Reservoir, the tailrace location was selected because of relative abundance, access to the site, and upstream location in the reservoir. Please also see response to USFWS comment #4.
USFWS	4	It would be helpful if PacifiCorp more fully described in the license amendments both (1) the consultation and design processes that it will carry out for each of the bull trout facilities prior to construction and (2) the monitoring and adaptive management procedures that it will carry out once the facilities are constructed.	Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will (1) follow the provisions in Sections 4.1.1 through 4.1.3 when developing designs for the facilities, and (2) follow requirements of the Settement Agreement section 4.10 which states "PacifiCorp shall provide for monitoring of performance as provided in Section 9, and make necessary and appropriate Facility Adjustments and Facility Modifications to the Yale and Merwin Downstream Bull Trout Facilities, in Consultation with the ACC and with approval of USFWS, to achieve relevant performance standards as provided in Section 4.1.4 above, provided that such modifications shall not require installation of a different type of passage facility".
USFWS	5	In several locations in the documents, it is stated that the Fish and Wildlife Service deferred a decision on whether to require construction of the Merwin Downstream Bull Trout Passage Facility. To be clear, the Fish and Wildlife Service did not defer this decision. According to Section 4.10 of the Settlement Agreement, the decision to require a downstream bull trout passage facility can be made no sooner than the 17th anniversary of the issuance of a new license for Merwin--or 2025--and is to be based on the population status of bull trout in Merwin Reservoir. The license amendments should correctly reflect when and under what circumstances a downstream bull trout collection facility would be constructed in the forebay of Merwin Reservoir.	Text in the Bull Fish Pasage Plan has been revised to reflect Settlement Agreement section 4.10.1 regarding the timing of a decision to construct the Merwin Reservoir Downstream Full Trout Passage Facility. The decision date timing per section 4.10.1 states: "If, pursuant to Section 4.1.9, PacifiCorp does not build the Merwin Downstream Facility described in Section 4.6, then when USFWS determines that bull trout populations have increased sufficiently in Lake Merwin, but not sooner than the 17th anniversary of the Issuance of the New License for the Merwin Project, PacifiCorp shall construct and provide for the operation of a passage facility similar to the Yale Downstream Bull Trout Facility at Merwin Dam (the "Merwin Downstream Bull Trout Facility")." PacifiCorp is obligated per the Settlement Agreement to take action followinng the USFWS decision.
USFWS	6	The documents do not contain clear goals and objectives that would allow the Fish and Wildlife Service and NMFS to determine the need to require PacifiCorp to construct full anadromous fish passage facilities in Yale Reservoir at the conclusion of the implementation, monitoring, and evaluation of the In Lieu Restoration Plan. Without specific, clearly stated goals and objectives, it is unclear how and when the decision to construct full anadromous fish passage in Yale Reservoir will be made. We recommend such language be included in the license amendments submitted to FERC.	The long-term benefits noted in Exhibit E are aligned with the potential enhancement projects identified in the Lewis River Settlement Agreement. The Settlement Agreement established guidance criteria for mitigation measure approval of in lieu activities, including an non-exclusive list of projects that qualify as mitigation measures under the In Lieu Fund. Settlement Agreement 7.6.3. These include targeting riparian restoration efforts along the most productive and/or degraded streams including the anadromous reaches of all tributaries to the lower Lewis River. Settlement Agreement Schedule 7.6.2.
US Forest Service	1	Referenced language: "fish passage facilites into or out of Merwin Lake are inappropriate" Comment: "This is only a preliminary determination by NMFS and requires consent from the Agreement parties."	Because Sections 4.1.9 and 4.5 through 4.8 of the Settlement Agreement contemplate that the Services may direct changes to the nature and timing of the Utilities' requirements to construct fish passage facilities no amendments to the Settlement Agreement are required. Langauge used in the Volume 1 document is a direct reference from NMFS and USFWS preliminary decision letters of April 2019.
US Forest Service	2	Referenced language: the definition of "New Information" Comment: "It is unclear whether the information was new"	Utilities consider "New Information" to be any data, analysis, reports, etc. prepared since November 30, 2004; the effective date of the Lewis River Settlement Agreement.
US Forest Service	3	PacificCorp mentions seeking to amend licenses and incorprate fishway prescriptions to direct "Implementing a habitat restoration program in lieu of constructing fish passage facilities into and out of Merwin Reservoir (the In Lieu Program)(PacifiCorp)." The comment states, "It seems that it is preliminary to approve an amendment to the license based on EDT modelling data that is based on an assumption of being able to get restored reaches back to pristine or template conditions until monitoring indicates this will actually result in fisheries numbers that exceed what fish passage would. According to the "Services" letter from April 2019, the EDT modelling is "cautioned" against using, so to base a license amendment on that would be preliminary."	EDT modeling is the best tool available to address section 4.1.9 of the Lewis River Settlement Agreement. In developing infomation to support the applications for license amendments, interested parties to the EDT modeling were invited to participate in the modeling effort; model assumptions were identified through that process. EDT modeling is a vaulable tool and was used to develop conditions of the Lewis River Settlement Agreement of which the USFS is a signatory.

US Forest Service	4	Referenced language: "Long-term Impacts to Fish" Comment: "Where is the comparison of the impacts of providing fish passage vs. In Lieu restoration to fish?"	Please see Exhibit E section E.4.1.1.1.
US Forest Service	5	Refernced language: "Habitat changes are expected to occur over time as a result of implementing restoration actions under the Merwin In-Lieu Program..." Comment: "Will this occur within a short enough timeframe and be substantial enough to see results from monitoring within the 10 years?"	Given that most of proposed restoration measures include placement of wood or floodplain reconnection, the physical response should be within the first bankfull or higher flow event, which typically occurs within a few years. Most studies on large wood placement show a physical response and localized increases in juvenile salmonids within a few years. Thus, Utilities believe that we will be able to detect a physical and biological response within the timeframe of the monitoring.
US Forest Service	6	Referenced language: "Program actions will result in long term benefits such as…" Comment: "This does not sound like restoration to "pristine" conditions, which is the assumption of the EDT model."	Because projects to be implemended with Merwin in-lieu funds have yet to be precisely defined, the EDT analysis was conducted by setting habitat conditions where actions may occur to template conditions, as defined by EDT. The bullet points within the document describe benefits expected to occur with habitat improvements. These benefits are consistent with improvements to stream habitat that would occur with restoration to template conditions.
US Forest Service	7	Referenced language: "long-term beneficial effects in the form of improved habitat complexity (e.g., pool development and increased off-channel habitat) to better support adult fish by providing more resting and spawning areas and to support juvenile fish with enhanced cover habitat and rearing areas." Comment: "How does this specifically address the limiting factors?"	The limiting factors analysis indicated that there was adequate spawning habitat upstream of Swift Dam and that the amount or quality of summer and winter rearing habitat were limiting Chinook, coho, and steelhead production. Based upon the research, modeling, and planning efforts to date, four potential types of restoration actions have been identified across multiple reaches and locations, which are: • Floodplain restoration to create off-channel habitat and reconnect side channels • Large wood placement to increase pools, habitat complexity, and fish cover • Riparian planting to increase shade and delivery of organic material (leaf litter, wood) • Road removal or restoration to reduce instream sediment (including culvert removal) These four restoration project types focus on improving and increasing quality of juvenile rearing habitat, although they will also improve spawning habitat.
US Forest Service	8	Referenced language: "The Services identified the following reaches known to support all three species since reintroduction efforts began in 2012: … Clear Creek (22.96 km)" Comment: "Only about 2 miles are habitat for Coho and Chinook"	Results of spawning and aerial surveys of Clear Creek indicate that coho have been observed at least 8 miles upstream of the stream confluence with the Muddy River and spring Chinook spawning at least 5 miles upstream of confluence.
US Forest Service	9	Referenced language: "Such projects can then be prioritized by the Services and ACC." Comment: "Any project on National Forest System lands will need NEPA and a Forest Service line officer's decision for the project(s) prior and it is recommended that this occurs prior to PA announcing requests for proposals."	The Strategic Plan has been revised to include that following the ACC review of Preliminary Reach Designs, the PA will notify the relevant land owner of project intent.
US Forest Service	10	Referenced langauge: "TAC and lead the ranking selection of project bids that best achieve goals and outcomes." Comment: "How will the criteria for ranking and selection be formulated and by who?"	As noted by LCRFB (#8) in their request to streamline the program, ranking/selection are unnecessary for strategic actions like those to be implemented under this program. Ranking criteria may be needed if funds become limiting; if so these will be developed based on review of similar regional habitat restoration programs and on consultation with the ACC.
US Forest Service	11	Referenced language: "The PA will provide day to day oversight and management of financial and technical elements of the In Lieu Program. Major roles and responsibilities will include the following:… Evaluation of proposals" Comment: "Only by the PA (one person)?"	The PA will oversee the process of identification and evaluation of habitat projects that will be presented to the ACC and Services for review and aproval. The PA will also provide the ACC with regular technical, budget, and schedule updates.
US Forest Service	12	Referenced language: "The Technical Advisory Committee (TAC) will be facilitated and administered by the PA and will be comprised of experienced technical experts…" Comment: "Are these paid experts or volunteers?"	Per recommendations to streamline program management, a separate TAC is unnecessary; the existing ACC will provide technical oversight. See related respone to LCFRB #19.
US Forest Service	13	Referenced language: "These reaches are: … Clear Creek (22.96 km)" Comment: "Only about 2 miles are habitat for Coho and Chinook"	Results of spawning and aerial surveys of Clear Creek indicate that coho have been observed at least 8 miles upstream of the stream confluence with the Muddy River and spring Chinook spawning at least 5 miles upstream of confluence.
US Forest Service	14	Referenced language: Figure 3 caption Comment: "NMFS priority reach for Clear Creek on the map is not shows as 22.9 km."	Results of spawning and aerial surveys of Clear Creek indicate that coho have been observed at least 8 miles upstream of the stream confluence with the Muddy River and spring Chinook spawning at least 5 miles upstream of confluence.
US Forest Service	15	Reference: Under the permits section, NEPA is listed. Comment: "NEPA is not a permit. NEPA will need to be complete prior to projects going out for solicitation. Who conducts the NEPA will need to be determined in consultation with the USFS, whether it is done in-house or contracted out. The key is that it is completed per USFS requirements and ultimately approved by the USFS."	Comment noted. The Utilities understand that NEPA is a process not a permit. This reference was included under the permits section to acknowledge that the NEPA process must be engaged to obtain any permits necessary for restoration activities within Gifford Pinchot National Forest. The Utilities are committed to working collaboratively with the USFS to ensure all USFS requirements are met.
US Forest Service	16	Reference: "NEPA compliance for habitat restoration is likely to meet the criteria for a streamlined Categorical Exclusion." Comment: "That completely depends upon the type of restoration that is proposed. In order to restore to "template" conditions, this may require reconnecting the valley bottom or floodplain, which may not fit within existing categorical exclusions. In addition, there is a regional EA for stream restoration that may be tiered to for certain project types."	Comment noted. At the appropriate time, following ACC project review, the PA will consult with the USFS regarding specific permitting needs for identified habitat projects on USFS land.

US Forest Service	17	Reference: In the section of key questions, "Has restoration of habitat under the In Lieu Program resulted in a statistically significant increase in the numbers of smolts produced, the number of successful spawners (number of breeders), and smolts per spawner, for salmon and steelhead in the Swift Basin?" Comment: "Increase relative to what? Shouldn't this be assessing relative to providing fish passage?"	Yes, text in Monitoring Plan has been modified that this is an increase compared to pre-restoration.
US Forest Service	18	Refernce: Table 3, year timeframe for population monitoring. Comment: "This will not provide results by the time necessary to make the decision about Yale fish passage in 2031"	Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by available monitoring time.
US Forest Service	19	Reference: "First, for the largest effect size, estimated sample sizes are less than one generation for some species, which is probably not realistic and a minimum of 5 years post-treatment monitoring will be needed. Second, given that to date the FSC has an efficiency of less than 50%, the number of smolts collected and passed downstream of Swift Dam do not represent total smolt production." Comment: "This also indicates that information will not be available in time for the decision of fish passage into Yale."	Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by available monitoring time.
US Forest Service	20	Reference: "Any fish monitoring using simple before-after design should focus on smolts enumerated with the FSC using a trend analysis for smolts and smolts per spawner. This seems tractable for coho and Chinook smolts though it may take 10 to 20 years to detect a response and even longer for steelhead given the variability in current pre-project (restoration) data." Comment: "Another indication of how this approach will not have the information needed for the Yale fish passage decision in 2031."	Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by available monitoring time.
US Forest Service	21	Reference: "Population growth rate and smolts per breeder or spawner (productivity) would be examined with the BA approach and genetic monitoring. Genetic mark-recapture monitoring (sometimes called parentage-based tagging) could be expanded to examine spatial structure and diversity though these would not likely be expressed until several generations, particularly if supplementation with hatchery fish continues." Comment: "Same comment [see comment 20]. Another indication of how this approach will not have the information needed for the Yale fish passage decision in 2031."	Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by available monitoring time.
US Forest Service	22	Reference: Weaknesses/Challenges of the BA approach in Table 10, "Lack of control watersheds that other factors may be responsible for any increase detected" Comment: "Could monitor for 10 years and then realize that other factors are responsible for increases detected."	That is possible. This is the challenge with population level monitoring using either a BACI or BA study design. Later in the document the text discusses using reference watersheds. The document also outlines a multi-pronged approach for evaluating population level response.
WDFW	1	Rather, based on the mandate in Revised Code of Washington (RCW) 77.57.030 requiring fishways at dams and obstructions, WDFW's position remains that fish passage is required at these dams. The biological basis for the law recognizes that access to habitat above dams is essential to maintain migratory fish populations, including salmon.	WDFW's position regarding fish passage is noted. WDFW is a signatory to the Settlement Agreement which through Sections 4.1.9 and Sections 4.5 through 4.8 contemplated that habitat restoration could be utilized in lieu of fish passage at the Proejcts. Moreover, the Utilities note that the independent application of RCW 77.57.030 to impose fish passage requirements on a FERC-licensed hydropower facility would be preempted by the Federal Power Act.
WDFW	2	WDFW contends that a separate process to amend the Settlement Agreement should occur prior to consideration of the Utilities' draft non-capacity license amendment applications. (PDF p.3)	See response to USFS comment # 1
WDFW	3	The Environmental Report fails to fully describe the opportunities lost by eliminating fish passage through Merwin Reservoir and from delaying the provision of fish passage through Yale Reservoir. Without a full description of the opportunities lost, a comparison and analysis of the incremental impact of the proposal cannot be adequately considered...Although the Utilities provide a thorough description of potential benefits to fish and wildlife from habitat restoration, the analysis does not address the negative effects of abandoning fish passage through Merwin Reservoir and the subsequent impact to the assumptions in the Lower Columbia Fish Recovery Board's 2010 Washington Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan. The report on fish, wildlife, and botanical resources is required, per 18 CFR § 4.51 (f)(3)(iv), to include "A description of any anticipated continuing impact on fish, wildlife, and botanical resources of continued operation of the project …" The impact to fish, wildlife, and botanical resources from continued lack of passage through Merwin and Yale reservoirs has not been described here.	See the response to Cowlitz Indian Tribe comment # 3.
WDFW	4	Please check that all references in text are included in E.5.0 References (18 CFR 4.51(f)(7)). The WSDOT 2019 citation for underwater noise propagation is not in the reference section.	Exhibit E section 5 now includes the reference: Washington Department of Transportation (WSDOT). 2019. Washington State Department of Transportation. Advanced Training Manual: Biological Assessment Preparation of Transportation Projects. Olympia, Washington. January 2019.

WDFW	5	The following citation should be used for "Washington Department of Fish and Wildlife (WDFW) has designated a number of cover types in the vicinity of the Lewis River Projects as priority habitats, including: caves, freshwater wetlands, fresh deepwater, streams, old-growth and mature forest stands, Oregon white oak woodlands, riparian areas, rural open space, areas with abundant snags and logs, and talus": Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington, p. 292.	Exhibit E section 5 now includes the reference: Washington Department of Fish and Wildlife (WDFW). 2008. Priority Habitat and Species List. Olympia, Washington, p. 292.
WDFW	6	the Environmental Report Long-term Impacts to Vegetation and Wildlife Habitat section notes the uncertainty inherent in favoring restoration at the expense of passage when it states "[f]ish habitat improvements would likely increase fish production, which would provide more food for wildlife that feed on fish including black bears, bald eagles, osprey (Pandion haliaetus), and common mergansers (Mergus merganser)" (emphasis added). The In Lieu Letter also identifies the uncertainty of "…the realized benefits (adult abundances) of reintroduction/fish passage, and in-lieu habitat restoration" as well as "…whether there is enough total habitat available to restore to achieve benefits equivalent to passage, enough time to realize benefits, and the likelihood of achieving pristine conditions…" This uncertainty should also be reflected in E.4.1.1 Fish Resources.	Please see Exhibit E section 4.1.1.3 which identifies that the In-Lieu Program Monitoring Plan aims to determine whether the in lieu projects have met both physical (design) and biological objectives at the project level and reach scale; implementation of this monitoring will help address the uncertainty.
WDFW	7	From WDFW's perspective, ACC approval of restoration and monitoring plans, as specified by the Service's preliminary determination, should occur before the plans are included in the applications for non-capacity license amendment submitted for FERC approval.	The Strategic Plan is required by Section 7.6.2(1) of the Settlement Agreement and must be approved by the Services within one year of the creation of the In Lieu Fund. The Monitoring Plan is required by NMFS' April 11, 2019 preliminary determination and must be approved by the ACC following the Services' final determination. The Bull Trout Passage Facility Plan is required by Section 4.10 of the Settlement Agreement and must be approved by USFWS, after consultation with the ACC, following the final determination.
WDFW	8	For this reason, WDFW believes the comments from other Settlement Agreement Parties to the Utilities should be appended as consultation materials to the non-capacity license amendment applications submitted to FERC. Including a full and broad view of the consultation and comments on the draft non-capacity amendments embraces the spirit of the Settlement Agreement as well.	The Utilities have included detailed information as an Appendix to Exhibit E - Consultation Record identifying the years-long interactions among the Utilities and the other Settlement Agreement Parties in developing the New Information supporting the Services' preliminary determinations. Included is information relating to comments on prior drafts of documents included in the application and documents provided as part of a dispute resolution process.
WDFW	9	The Utilities should work collaboratively with the ACC to produce a Strategic Plan the ACC supports, and this support should come before a Strategic Plan is included in any non-capacity license amendment application.	Per comments received on review of the Draft Applications for FERC License Amendments, the Utilities have revised the Merwin In Lieu Strategic Plan. As part of the FERC license amendment proceeding, it is expected that the ACC and others will be granted an opportunity to provide input on the revised plan after the Utilities submit the amendment application. If the ACC or WDFW can consent to the Plan, the Utilities would be willing to have further engagement on the plan.
WDFW	10	The administration of the Merwin In Lieu Program and the Habitat Restoration Plan (HRP) are layered with unnecessary committees, steps, and procedures. WDFW encourages the Utilities to develop a streamlined approach for the Merwin In Lieu Program and the associated Strategic Plan and HRP.	The Strategic Plan has been revised to reflect a more streamlined management approach as recommended by WDFW and LCFRB (see response to LCFRB comment #8).
WDFW	11	Please include a legend in Figure 1. It is unclear if the red dots are the upper extent for fish passage or used to identify the stream/river.	Figure 1 of the Strategic Plan has been revised.
WDFW	12	The Strategic Plan identifies previous restoration work in the Lewis River watershed by sponsor. Please identify the location in the watershed the sponsors completed restoration activities. Since NMFS designated that restoration efforts focus on stream reaches above Swift reservoir, limiting the list to projects above Swift reservoir would be more appropriate.	To the extent possible, prior restoration projects completed in the upper watershed have been identified/summarized - sources of information include NOAA's PNW Salmon Habitat Project Tracking Database.
WDFW	13	It currently inappropriate to state "…it is the intent of the Utilities, Services, and Aquatic Coordination Committee (ACC) to develop a framework for an [Habitat Restoration Plan (HRP)] that will include reach and site-specific recommendations for restoration and enhancement measures." WDFW believes that the Utilities have not confirmed with the ACC that it supports development of a framework for HRP or the content of the HRP.	Text has been revised as follows: "As described in Section 2.0 of this Plan, it is the intent of the Utilities and Services~~, and Aquatic Coordination Committee (ACC)~~ to develop a framework for an HRP that will include reach and site-specific recommendations for restoration and enhancement measures."
WDFW	14	If the organization of the Merwin In Lieu Program administration is maintained, WDFW believes the ACC should have the opportunity to review the Scope of Work before a Request for Proposals is released for the Program Administrator position. In addition, WDFW would like to participate on any interview panel.	Comment noted. Implementation process of the Merwin In Lieu Program as intially presented has changed; see response to LCFRB comment #19. Regardless, WDFW as a member of the ACC will be consulted on key milestones during preparation of the HRP; including development of concept plans, 30% design, and final design.
WDFW	15	Please include additional information for "…solicit[ing] matching funding for habitat improvement grants or other funding elsewhere in the Lewis River watershed…" where "Utility funded habitat enhancement projects will be conducted above Swift Reservoir…" and "…matching funds contributed by others will be unrestricted and available for enhancement projects elsewhere in the Basin, including reaches downstream of Merwin and in the mainstem Columbia River." Additional information is necessary to determine who benefits—the restoration by the Utilities, or the projects with unrestricted funds. It seems unlikely that matching funds would be used to increase the amount of restoration above Swift Reservoir.	The Utilities seek to use the Meriwn In-Lieu Fund to improve aquatic habitat upstream of Swift Dam. Any matching funds obtained through implementation of the final Habitat Restoration Plan would be directed to non-Habitat Restoration Plan projects that benefit Lewis River anadromous fish downstream of Merwin Dam. Matching funds will not benefit Utilities obligation.

WDFW	16	The Strategic Plan alludes to the geographic scope of the HRP in several sections: Page 7 - Above Swift, downstream of Merwin Dam and including the East Fork Lewis River watershed and mainstem Columbia River per the geographic scope of where projects with matching funds can occur; Page 11 - The Lewis River per the goal listed in Table 2; and Page 12 - Areas under the purview of the Lower Columbia River Fish Recovery Board per the footnote for Lower Columbia River watershed within the goal provided in 2.2 Restoration Goals and Objectives. From WDFW's perspective, the Utilities did not seek input from the ACC before establishing the geographic scope of the HRP. The ACC should decide whether the HRP should correspond with the scope provided in the In Lieu Letter to focus above Swift Reservoir, or that proposed in the Strategic Plan. Regardless, the geographic scope of the HRP should be consistent throughout the Strategic Plan.	In contrast to the geographic scope of project examples included in Attachment 7.6.2 of the Settlement Agreement, the scope of the HRP reflects NMFS's April 11, 2019 letter to the Utilities to focus work above Swift Dam. The Strategic Plan has been be revised for consistency as noted; and to account for modification of the geographic scope of the In Lieu program should that be recommended by the ACC.
WDFW	17	The role of the ACC is listed as providing "…technical oversight and peer review capacity … including but not limited to: [p]roviding a sub-group of habitat experts to review and support completion of a draft HRP; [r]eviewing and approving a final HRP; and [s]upporting HRP actions within respective ACC representative's organization." Other activities are mentioned throughout the Strategic Plan but are not included here. As proposed, the ACC plays a very limited role in the Merwin In Lieu Program. At a minimum, WDFW believes the ACC should have input on selecting the Program Administrator, approve the TAC list of prioritized specific habitat work to be completed, and the Utilities should have obtained ACC approval of the restoration goals and objectives when drafting the Strategic Plan and HRP framework.	Strategic Plan has been revised to clarify the role of the ACC. Per requests for streamlining program management, Utilities (or its contractor) will function as PA and the ACC as advisors to the program.
WDFW	18	From WDFW's perspective, the ACC had no role in the initial development of the studies to be implemented and the methods of those studies. Only after the contracts were awarded did the ACC become involved. The ACC guided selection of EDT input parameters/assumptions, but provided very little other input for the studies. The main role of the ACC was to review the final New Information Report. To say the New Information Report was developed by the ACC is inaccurate.	Engagement with the ACC originated in November of 2011. Since that time study plans, study updates, presentations and final reports have been provided to the ACC for informational purposes and for review and comment (See Consultation Record). The Strategic Plan as been edited to: "This section provides goals, objectives, and a framework for the HRP, recognizing that much of the groundwork has been completed through the New Information Report developed by the Utilities ~~and ACC~~ over the last several years (PacifiCorp 2016, Al-Chokhachy 2018).
WDFW	19	WDFW suggests the Utilities verify with the NMFS the reasons why it selected Clearwater River, Clear Creek, North Fork of the Lewis River, and Drift Creek. The Strategic Plan states that "[e]nhancing and protecting these reaches recommended by the Services will focus on strongholds, or areas with the highest quality habitat and highest densities of spawning spring Chinook, steelhead, and coho." Yet, NMFS indicated to the ACC that these reaches were selected because EDT analysis predicted the largest increases in abundance of Chinook, coho, and steelhead. In addition, WDFW believes the ACC should discuss if focus should be on protection or restoration.	Comment noted. The Strategic Plan aligns with the direction NMFS provided in their April 2019 regarding identified tributaries. During the implementation of the Strategic Plan and following Habitat Restoration Plan, information will be provided to the ACC identifying treatments for each of the NMFS reaches.
WDFW	20	The New Information identified the 25 highest priority reaches throughout the basin, but did not rank them. The ACC used the New Information list of the 25 highest priority reaches, as well as best professional judgement to create a new ranked reach list for the Aquatic Fund Program project selection. This list should be acknowledged and used within the process. In addition, please identify the ranking of the reaches selected by the Services.	Per comments received from LCFRB and WDFW regarding streamlining the Merwin In-Lieu implementation program management, the process has been revised. In doing so, per LCFRB recommendation, ranking of reaches is unnecessary or less important for strategic actions. However, text in the Strategic Plan has been modified to note the availability of the Aquatic Fund Program project list which can be considered during project identification.
WDFW	21	Figure 4. and other sections within the Strategic Plan propose to prioritize protection and preservation above restoration of watershed processes and habitat features. This is contrary to the goals and objectives outlined in the In Lieu Letter and in Settlement Agreement section 7.6.3. Prioritizing protection and preservation projects before restoring habitat functions and features is not likely to meet the In Lieu Letter or Settlement Agreement goals/objectives. From WDFW's perspective, not only should the ACC collectively determine the goals of the Merwin In Lieu Program and HRP, it should also collectively determine the prioritization of protection and preservation, restoring watershed processes, and restoring habitat features.	Figure 4 is a generalized approach for restoration projects and is consistent with NMFS's April 11, 2019 letter (In Lieu Letter) to the Utilities recommending that restoration be focused on reaches above Swift that benefit all three species and to address limiting factors identified by EDT (key habitat (e.g. pools), habitat diversity, channel stability and sediment load). Per Table 2 in the revised Strategic Plan, restoration goals will be confirmed in light of priorities of Services, ACC, Tribes, and other stakeholders.
WDFW	22	The reference listed in the Restoration Goal found in Table 2, "[s]upport re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead, and achievement of the Lewis River SA Outcome Goal (Defined in Settlement)", is misleading. "Defined in Settlement" only applies to "…Lewis River SA Outcome Goal…" and "…substantial increases in numbers of ESA listed salmon and steelhead…" as it pertains to reintroduction. "Support re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits…" are not found or defined in the Settlement Agreement. Those references should be removed.	Text in Table 2 has been revised as follows: "Defined in Settlement Agreement and the Services' April 12, 2019 Letters. Support achievement of the Lewis River SA Reintroduction Outcome Goal. Support re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits, and substantial increases in numbers of ESA listed salmon and steelhead (ACC, Utilities)."

WDFW	23	HRP restoration goals are included in several sections of the Strategic Plan and are internally inconsistent: Page 11 – “Support re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead, and achievement of the Lewis River SA Outcome Goal (Defined in Settlement)”. Page 12 – “…support re-establishment and improvement in the form and function of aquatic habitats of the Lower Columbia River watersheds that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead and achieve the Lewis River SA Outcome Goal.” Areas under the purview of the Lower Columbia River Fish Recovery Board. The restoration goals listed above also do not match the goals/objectives of the In Lieu Letter or Settlement Agreement: Services Letter – “…achieve benefits equivalent to passage, enough time to realize benefits, and the likelihood of achieving pristine conditions if in-lieu restoration was selected at Yale.” Settlement Agreement section 7.6.3 – “...achieving benefits to anadromous fish populations equivalent to or greater than benefits that would have occurred if passage through Yale and/or Merwin reservoirs had been provided, as determined by the Services based on the best information available at such time.” This subsection also specifies that “In Lieu Fund monies will be spent on mitigation measures that collectively contribute to meeting the [goal/] objective…” From WDFW’s perspective, the goal(s) and objectives of the Merwin In Lieu Program and HRP should be determined collectively with the ACC. The ACC should discuss the restoration goals found in the Strategic Plan, In Lieu Letter, and Settlement Agreement to determine the appropriate restoration goal for the HRP and modify the framework accordingly. This should be done before the ACC considers approval of the Strategic Plan.	Text in section 2.2 of the Merwin In Lieu Strategic Plan has been revised to clarify goals, and references have been checked for consistency throughout the document.
WDFW	24	One of the objectives listed for the HRP is: “Consistency with the Lower Columbia Salmon Recovery Plan. Planning, to the extent possible, will be integrated with strategies developed under other regional processes to recover salmon, steelhead, and bull trout listed under the federal ESA.” The top prioritized measure for the Upper North Fork Lewis Basin in Lower Columbia Salmon Recovery Plan is “[r]estore access through hydropower system.” Sub-measures include “A) Restore access above Merwin, Yale, and Swift Dams for anadromous salmonids and B) Restore access upstream and downstream through the Dams for Bull Trout and other resident fish.” By eliminating fish passage through Merwin and delaying the decision for Yale, the HRP is already inconsistent with the objective above.	Text in the Merwin In Lieu Strategic Plan has been revised to the following "Consistency with the goals of the Lower Columbia Salmon Recovery Plan. Planning, to the extent possible, will be integrated with strategies developed under other regional processes to recover salmon, steelhead, and bull trout listed under the federal ESA.” The Utilities maintain that a greater benefit towards the recovery of coho, spring Chinook and winter steelhead may be achieved by implementing the Merwin In Lieu fund alternative instead of fish passage into Merwin reservoir. The proposed Bull Trout Fish Passage Plan includes the installation of fish passage facilities to provide bull trout the opportunity to move between reservoirs.
WDFW	25	Objectives are usually measurable and must be accomplished in a defined time period. An example of this can be found in the In Lieu Letter Table 1 listing the expected fish production from passage and without, and the monitoring period of 10 years. The above objective and the others listed in the section appear to be guiding principles for the HRP rather than objectives in that they lack time period benchmarks. The criteria found in 2.6 Project Ranking to prioritize (rank) projects for funding align more closely with objectives for the goals listed in the In Lieu Letter and Settlement Agreement. “…[T]hese will include: the expected increase in juvenile and adult spring Chinook, coho, and winter steelhead abundance (based on existing EDT outputs); whether the project benefits all three focal species; the degree that it would provide resilient habitat over changing conditions (restore processes); cost effectiveness; and many other technical and nontechnical criteria (e.g., access and feasibility).”	Broad aims of the In Lieu Program are described in Section 2.2 of the Strategic Plan; as noted in the comment these are guiding principles that will apply throughout the program; they are not tied to a schedule and therefor no timeline can be established.
WDFW	26	WDFW agrees that the most robust designs to test fish population response involve some variation of a BACI design. Based on WDFW’s experience for restoration fish response monitoring, WDFW believes that this plan is a good start but does not meet the criteria for determining independent fish population benefits...Study design and analysis elements, such as assumptions and assumption testing, detection and treatment of outliers, model validation, and the expected precision for juvenile abundance estimates are missing (Zuur et al. 2010, Zuur and Ieno 2016).	Text has been added to the Monitoring Plan to describe procedure for processing data.

WDFW	27	While it is very challenging to implement BACI designs at the population scale for fish population response monitoring, WDFW believes BACI designs can be implemented in tributary and reach scale fish response monitoring. WDFW recommends implementation of BACI designs for tributary and reach scale fish response monitoring because they provide a more robust study design.	First, it is important to note that BACI designs are considered the most robust design, but have proven difficult to implement at watershed or tributary scale and few have been successful (Roni et al. 2015; Bennett et al. 2017, Roni et al. 2018). Similarly, reach-scale BACI or multiple-BACI monitoring of fish response to restoration done by both the SRFB and BPA has seen many challenges and produced inconclusive results in most cases. It is possible to separate individual tributaries into treatment and controls, but without adequate baseline data from a number of tributaries showing that the fish abundance is on a similar trajectory, it is unclear which tributaries would serve as an adequate control (or controls). Looking at comparing two tributaries above Swift is not a population level evaluation, but would be a reach or tributary level evaluation As has been shown in other population monitoring studies (Johnson et al. 2005), a poorly selected control can decrease the likelihood of detecting a response rather than increase it. Moreover, having balanced years of before and after data helps increase likelihood of detecting response (Smokorowski and Randall 2017). BACI designs also work well when the restoration and the physical and biological to response is immediate, which is rarely the case and unlikely to be the case for the Merwin In Lieu Program. Given the time frame for the In Lieu restoration and the monitoring, and problems with BACI design outlined above, Utilities maintain the best approach for population level monitoring is BA monitoring of smolts for the entire basin and comparing that to out-of-basin reference watersheds to account for natural variability. At reach scale, based on our experience and simulations, a BACI design will be used for physical monitoring, and an extensive post-treatment for measuring fish response. Based on clarification with WDFW June 18, part of this comment is about tributary or reach-scale response using smolt trapping. Unfortunately, there do not appear to be any suitable control tributaries above Swift to pair with those schedule for treatment. It may be possible to split a tributary into two reaches and install two smolt traps and monitor those before and after restoration. This will depend in part on specifically where restoration will occur in priority tributaries and reaches, topography, road access, and whether logisitically smolt traps can be installed and maintained.*To address this, a paragraph was added to the Monitoring Plan indicating that PacifiCorp wil examine the feasibility of using a BACI design in a tributary to address concerns about reach-scale monitoring.*
WDFW	28	The authors should indicate how they will test for assumptions and outliers, and other analysis methods that will be used if t-test assumptions are not met (Ramsey and Schafer 2002). The authors should discuss in more detail issues with type I and II errors and should state the significance level, which is generally α=0.05. There has been a growing concern regarding the use of p-values and we recommend reporting the 95 % confidence or credible interval.	The Monitoring Plan describes how we will examine data for outliers and test model fit. Text has been added to indicate assumptions of the t-test and non-parametric tests that will be used if assumptions are not met (largely normality). It should be noted that paired-tests are fairly robust to potential violations in assumptions about normality. Text has also been added to indicate reporting 95% CI in addition to looking at statistical significance at 0.05 and 0.10 level of significance.
WDFW	29	The authors may consider robust regression approaches using student's t distribution to more adequately address year and species analyses. A more robust approach may include generalized liner mixed models (GLMM) for count data using Poisson or Negative Binomial distributions (Zuur et al. 2009).	Text has been added to the Monitoring Plan to indicate GLM will be used where appropriate.
WDFW	30	Another concern is that fish response monitoring is limited to juvenile salmonid monitoring in the later summer and late winter/spring... Since the current MP is likely to have low statistical power for spring Chinook salmon, we recommend a BACI design for year-round tributary outmigrant trapping for spring Chinook salmon to evaluate restoration. WDFW implements year-round trapping supplemented with PIT tagging for spring Chinook in the Chiwawa River, a tributary to the Wenatchee River. This type of smolt trapping project could be used as a basis to develop BACI designs to evaluate the effectiveness of restoration in increasing juvenile outmigrant abundance.	Summer and winter rearing are typically key points in life history limiting a population. Moreover, their is typically limited movement at summer low flow and winter low flow, and key points to measure abundance. See previous response in regards to issues with BACI design in this instance particularly given that the Services required a population level response upstream of Swift Dam. Measuring a couple of tributaries will not answer this, not to mention the BACI design is unlikely to detect a response in this instance. However, based on clarification with WDFW June 18, this comment is about tributary or reach-scale response using smolt trapping and concerns about early migrating juvenile spring Chinook. Unfortunately, there do not appear to be any suitable control tributaries above Swift to pair with those scheduled for treatment. It may be possible to split a tributary into two reaches and install two smolt traps and monitor those before and after restoration. This will depend in part on specifically where restoration will occur in priority tributaries and reaches, access, and whether logisitically smolt traps can be installed. *To address this, text was added to the Monitoring Plan to indicate that PacifiCorp will examine the feasibility of using a BACI design in a tributary to address concerns about reach-scale monitoring.*
WDFW	31	The basic assumption in the MP for reach scale fish response monitoring is that snorkel observer efficiency is constant between treatment and control reaches. If this assumption is not met this study design will produce biased results. Observer efficiency is variable based on experience, environmental condition, habitat, and other variables (Murdoch et al. 2018). More importantly, this assumption cannot be verified and this approach provides an index, not an estimate, of population abundance. Therefore, the proposed MP approach, using snorkel surveys, will not provide an estimate of the improvement of population size due to restoration, which is one of the conditions in the In Lieu letter.	Text has been added to clarify that the same snorkelers would survey each treatment and control pair to eliminate bias. The Monitoring Plan also describes procedure for training snorkel crews to minimize bias. If population estimates or standard error estimates are desired, bounded counts (repeated counts) could be conducted in a subset of habitats, but most published studies on snorkel surveys use single counts. Yes, the snorkel surveys provide an index of abundance, but they have been shown to be a reasonable estimate (Hankin and Reeves 1988) and under some winter conditions better than electrofishing methods (Roni and Fayram 2000). *To address concerns about snorkeler efficiency and accuracy of abundance estimates with snorkel surveys, text has been added to the Monitoring Plan to indicate that bounded counts or mark-recatpure estimates will be conducted in a subset of habitats sampled.* The intent of the reach-scale level monitoring is not population monitoring, but reach-scale abundance estimates. The population level monitoring focuses on smolts and smolts per spawner/breeder and is describe elsewhere in the Monitoring Plan.

WDFW	32	As pointed out in the MP, it is challenging to determine population level responses, and approaches to estimate spawners and smolts are likely the best approaches to move forward. However, the population level monitoring in the MP did not meet the requirements in the In Lieu letter. In the MP it states: "The main question that population level monitoring above Swift Dam would be designed to answer is: Has restoration of habitat under the In Lieu Program resulted in a statistically significant increase in the numbers of smolts produced and adult salmon and steelhead successfully spawning above Swift Basin?" WDFW agrees that it is important to have a monitoring design to support a population level response to restoration. However, the study design must quantify that the adult population response from restoration was greater than the NMFS restoration scenario to mitigate for no fish passage at Merwin. Since the MP did not focus on the requirements in the In Lieu letter the population level, monitoring is inadequate.	Utilities maintain the proposed level of monitoring of smolts, while not perfect given the time frame and lack of long-term pre-project data, does address what was requested by NMFS. Determining the adult response is not possible given reintroduction is still ongoing and the number of adults are still largely composed of hatchery fish. Maintaining a relatively constant number of fish during the In Lieu Restoration Program, will help determine the juvenile and smolt response to restoration. Moreover, looking at the number of effective breeders and smolts per breeder will provide population level information on adult reproductive success. *Text was also added to the Monitoring Plan to indicate that Beverton-Holt stock recruitment curves will also be compared before and after restoration assuming sufficient data is available.*
WDFW	33	The MP evaluated different approaches, but WDFW found it difficult to understand the population level recommendations. Page 31 of the MP states: "Population level monitoring of smolts, effective breeders, and smolts per breeder and spawner will be analyzed using both t-test and trend-based analysis as described in population level monitoring section." Page 23 states: "the following will be conducted: 1) before and after monitoring of smolts using the FSC to measure changes in smolt numbers and smolts per adult over the long-term, and 2) begin collecting genetic samples from all or a suitable sample of adults transported upstream of Swift Dam (2020) and a subset of juveniles at FSC (2021) to measure successful breeders and smolts per breeder, and 3) using before and after habitat data collected in restored reaches and EDT modeling to determine if habitat improvements can support juveniles and adults at or above levels predicted by EDT model before restoration." These inconsistencies must be reconciled.	The Monitoring Plan has been revised in attempt to clarify what is proposed and ensure consistency between sections.
WDFW	34	The MP recommends t-test and trend analysis of restoration response indicators including smolts, effective breeders, and smolts per breeder and spawner. As mentioned above, this is not an appropriate analysis; the indicators of smolts and breeder/spawners is a function of the number of adult salmon and steelhead released and the amount of habitat. In other words: if the breeder/spawner to smolt relationship follows a Beverton-Holt (BH) curve; the more adults released, the more breeders/spawners and smolts will be produced.	Text has been added to the Monitoring Plan to note the total number of adults released above Swift will be controlled so to have nearly equal number of released fish. Thus increases in smolt per breeder and successful breeder can be attributed to restoration or factors other than simply changes in number of adults released. Text has also been added to indicate that, assuming there are adequate years of data before and after restoration, Beverton-Holt curves will be fitted to data and compared before and after restoration. In discussing with WDFW, WDFW clarified they also thought we should compare the BH curves to productivity estimates from EDT. EDT is a Beverton-Holt built on habitat and not fish data. In addition, EDT uses hatchery fish and assumes 80% reservoir survival. Thus, comparing productivity estimates from EDT to BH curves from fish data collected before and after restoration would be problematic.
WDFW	35	WDFW recommends using a GLMM to test the null hypothesis of no difference between the offspring and variables influencing reproductive success. The MP authors should indicate how they will obtain representative first and second samples. The third approach is based on collection of habitat data before and after restoration to determine if the number of smolts and adults predicted by the EDT model increased. WDFW does not support this approach because it provides no empirical evidence that there was a smolt or adult increase in abundance.	The proposed use of GLM by WDFW seems to be focused on a study that looked at trying to model reproductive success in response to a suite of environmental factors, where the Monitoring Plan is looking to measure a direct response to a specific treatment. A GLM would be more appropriate for a multiple BACI design, and we are very familiar with using it to analyze BACI data. In fact, it is likely Utilities will use a mixed effects BACI GLM to examine the reach-scale habitat response. Text has been added to indicate that every nth adult or smolt will be sampled across the season to ensure a representative sample of adults (first sample) and juveniles (second sample) are collected for parentage analysis. Comment noted on EDT.
WDFW	36	Given the reliance by NMFS and PacifiCorp on the EDT model, WDFW believes the most defensible path forward is to set expectations for a numerical fish response to restoration based on the EDT model.	Text has been added to the Monitoring Plan to indicate that in addition to statistical tests, the results will also be compared to predicted outcomes by EDT.
WDFW	37	Therefore, WDFW proposes the MP utilize collection of unbiased and precise estimates of spawner abundance, smolt abundance, and survival to validate the Merwin In Lieu BH curve for the three species of interest. WDFW recommends the spawner to smolt approach because rapid implementation of effective restoration in a few years could lead to rapid detectable changes (Solazzi et al. 2000, and Bouwes et al. 2016), allow sufficient spawner and smolt estimates to estimate the BH curve, and the robustness of this method as demonstrated by Bradford et al. (2005).	PacifiCorp is working to improve their estimates of spawner success and their should be data to do this, but it is very unlikely there would be sufficient data before and after restoration to fit a BH curve for any of the species. Moreover, PacifiCorp will be controlling the total number of fish released above Swift, which may further complicate fitting a stock-recruitment curve. The Monitoring Plan includes examining smolts-spawner/breeder as an indicator of population response, which is a more straightforward approach than attempting to fit BH curves to small datasets. *However, text has also been added to the Monitoring Plan to indicate that, assuming there adequate years of data before and after restoration, Beverton-Holt curves will be fitted to data and compared before and after restoration.*
WDFW	38	As WDFW identified in its September 2018 letter, improvements to the current monitoring program are needed to meet the NMFS population monitoring guidance (Crawford and Rumsey 2011) and will be needed to determine population level responses to restoration in lieu of fish passage at Merwin. For example, the Utilities indicated in 2017 that the current methodology to estimate coho salmon spawners based on redd surveys is likely biased. The bias is likely due to not meeting the assumptions required for unbiased redd surveys and the current estimates do not account for uncertainty in redd life and observer efficiency (Johnson et al. 2007, Gallagher et al. 2007, Gallagher et al. 2010, Murdoch et al. 2018). It is essential that the fish monitoring estimates are unbiased with an acceptable level of precision (Crawford and Rumsey 2011, Skalski et al. 2012). Monitoring improvements are needed for other species and life stages as well.	As part of the development of the In Lieu Monitoring Plan, PacifiCorp is reviewing their current fish monitoring including spawner and redd surveys to address biases and make sure it is adequate to meet needs of In Lieu monitoring. This includes modifying redd and spawner surveys to include collection of genetic samples and making sure current habitat surveys cover priority reaches.
WDFW	39	From WDFW's perspective, ACC approval of restoration and monitoring plans preliminary determination, as required by the Service's in the 2019 In Lieu Letter, should occur before they are included in the non-capacity license amendments submitted to FERC approval.	See response to WDFW comment #7

WDFW	40	On August 1, 2019, the Utilities provided the ACC preliminary draft plans for a 30-day review. WDFW provided some comments on August 29, 2019. WDFW requests that all correspondence be included in full as part of the ACC / TCC Comment Attachment for the plans. In addition, WDFW requests that the ACC correspondence and written communication regarding development of the in lieu decision and plans be included as consultation materials submitted to FERC for the draft non-capacity license amendment applications. WDFW also believes the comments submitted by parties to the Settlement Agreement should be appended as consultation materials to the non-capacity license amendment applications submitted to FERC.	See response to WDFW comment #8
WDFW	41	WDFW is concerned that the Bull Trout Passage plan does not provide complete passive volitional connectivity from the upper Lewis Basin to the Columbia River. Connectivity is listed as a primary demographic threat to the Lewis River bull trout population in the USFWS Coastal Recovery Unit Implementation Plan for bull trout (USFWS 2015). WDFW is concerned with the deferral of a decision by the USFWS on whether to require construction of the Merwin Reservoir Downstream Bull Trout Passage Facility (recognizing the decision is not formally due until 2025) and thus, that the Bull Trout Passage Plan does not provide plans for complete connectivity from the upper Lewis Basin to the Columbia River. Specifically, the proposed plan excludes fish that currently reside in Merwin Reservoir and relies on trap and haul of bull trout from Swift and Yale Reservoirs which may or may not be actively moving downstream from the upper to the lower basin. This plan does not propose any downstream passage or mitigation for Merwin Reservoir.	As noted by the USFWS comment 5, the USFWS is not deferring a decision to construct the Merwin Reservoir Downstream Full Trout Passage Facility, the decision date timing is per section 4.10.1 of the Lewis River Settlement Agreement which states: "If, pursuant to Section 4.1.9, PacifiCorp does not build the Merwin Downstream Facility described in Section 4.6, then when USFWS determines that bull trout populations have increased sufficiently in Lake Merwin, but not sooner than the 17th anniversary of the Issuance of the New License for the Merwin Project, PacifiCorp shall construct and provide for the operation of a passage facility similar to the Yale Downstream Bull Trout Facility at Merwin Dam (the "Merwin Downstream Bull Trout Facility")." PacifiCorp is obligated per the Settlement Agreement to take action following the USFWS decision. Text has been added to section 1 of the Lewis River Bull Trout Fish Passage Plan.
WDFW	42	WDFW does not have major concerns with the preferred alternatives that the Utilities has proposed for the upstream adult collection methods; however, the proposed downstream Merwin-style trap for the Yale forebay needs further consideration.	Comment related to upstream adult collection noted. Consistent with section 4.10 of the Settlement Agreement, PacifiCorp has included within the Bull Trout Fish Passage Plan conceptual designs for a modular floating Merwin-type collector to be installed just upstream of Yale Dam. Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will engage the ACC per Settlement Agreement requirements and seek the engagement of the LRBTRT in producing the final facility designs and operations plan, and the requisite monitoring studies.
WDFW	43	Additionally, the Bull Trout Passage Plan does not address current downstream passage collection efficiencies for bull trout at the Swift Floating Surface Collector (FSC) that might be negatively impacting downstream bull trout passage from populations above Swift Dam. The 2004 Settlement Agreement states in section 4.1.6, that PacifiCorp shall design and construct downstream fish passage facilities to achieve the following standards for each species (i) a Capture Efficiency (CE) of equal to or greater than 95% and (ii) a Capture Survival (CS) of equal to or greater than 99.5% for smolts and 98% for fry, and (iii) adult bull trout survival of equal to or greater than 99.5%. While these Capture Efficiencies are established for anadromous fish, this same standard should apply to bull trout collection. Ideally, this system would provide bull trout the opportunity to express the full complement of bull trout migratory strategies and life histories (i.e., anadromous, fluvial and adfluvial).	Bull trout are not salmon or steelhead, and as such they do not share the same instinctual impetus for certain behaviors. A bull trout hatched in the headwaters of its natal stream, or a juvenile that migrates to a large lake, river, or ocean, may well choose to stay in any of these areas. On the other hand, salmon (and for the most part steelhead) juveniles almost across the board have a strong instinctual behavior to move downstream to the ocean. This makes gathering data such as collection efficiency fairly straightforward for these species. In a landscape such as Swift Reservoir and the Floating Surface Collector, it can be assumed that all the salmon/steelhead juveniles that are tagged want to leave the system. This is not the case with bull trout. Researchers would have no idea if the fish they tag might actually ever volitionally make a downstream migration. Even if a tagged bull trout came within the zone of influence of the floating surface collector, yet it was not captured, does that mean the collector was not effective, or did that fish simply not want to move downstream? Capture facility effectiveness monitoring for bull trout will be difficult. Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will engage the ACC per Settlement Agreement requirements and seek the engagement of the LRBTRT in developing monitoring studies. To date, no fish passage collection efficiency standard has been developed for bull trout, and the Utilities will look to the USFWS to set this protocol.
WDFW	44	Current smolt sampling protocols at the Swift FSC include subsampling during periods of peak migration, which may not accurately account for all juvenile bull trout that may be of similar size as out-migrating steelhead smolts if their abundance is low and/or sub-sampling rates are inadequate to detect them. Without accounting for these fish, the actual number of bull trout that have been transported to the lower Lewis is unknown. WDFW recommends the Bull Trout Passage Plan include a discussion of improvements that can be made to the FSC to increase bull trout collection and accounting.	Comment noted. PacifiCorp continues to seek to improve the Swift Floating Surface Collector collection efficencies for transported species. Over the years, facility improvements have been made increasing the collection efficency for coho, spring Chinook and steelhead. Additional projects are being planned for continuous improvement. It is expected that facility improvements for salmon and steelhead will increase bull trout collection. Given the number of fish that enter the collection facility, it is not appropriate to handle each fish just to know the exact number collected. The ACC has agreed to a subsampling protocol with realization that small bull trout may not be counted. That said, there are times of the year when every fish collected is counted.
WDFW	45	WDFW suggests that PacifiCorp review this project for new engineering ideas that may be relevant to the perceived engineering constraints on the Lewis River.	Comment Noted
WDFW	46	The current Bull Trout Passage Plan does not provide for realistic collection of subadult/adult bull trout that are attempting to move downstream through the projects.	The Utilities maintain the proposed Yale downstream collector design follows the intent of the Lewis River Settlement Agreement Section 4.10, which states the facility shall be similar in magnitude and scale as a modular floating Merwin-type collector and is not intended to be a passage facility of the same magnitude and expense as the Swift Floating Surface Collector. The Utilities will adaptively manage the proposed downstream bull trout facilities, in consultation with the USFWS, ACC and the LRBTRT, to capture bull trout adults and sub-adults as safely and effectively as possible under the proposed design.
WDFW	47	WDFW recommends that plans for the Yale downstream passage facility be updated to incorporate basic design elements and attraction flows as described above.	Consistent with section 4.10 of the Settlement Agreement, PacifiCorp has included within the Bull Trout Fish Passage Plan conceptual designs for a modular floating Merwin-type collector to be installed just upstream of Yale Dam. Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will engage the ACC per Settlement Agreement requirements and seek the engagement of the LRBTRT in producing the final facility designs and operations plan, and the requisite monitoring studies.

WDFW	48	The current Bull Trout Fish Passage Plan does not include or discuss the need for monitoring and evaluation nor provide a clear plan for adaptive management. WDFW strongly recommends that the Bull Trout Passage Plan specify a robust monitoring and evaluation plan to evaluate design, operations and effectiveness for all proposed upstream and downstream installations as stated in Section 4.10 and Section 9 of the Settlement Agreement. Identifying when bull trout collection occurs (e.g., May – October) and decisions on how and where to transport fish should be an adaptively managed process between the Utilities and the ACC. The current plan also does not specify contingencies or specify strategies in case these assessments identify issues or shortcomings of the proposed approach. WDFW recommends an adaptive management approach be included as part of the proposed plan. Evaluating the effectiveness of the proposed facilities will allow the ACC representatives and their respective agencies/organizations to understand how well the Utilities are addressing the connectivity threat outlined by the USFWS (USFWS 2015), which is of primary concern in trying to move the Lewis River bull trout population towards recovery and delisting.	Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will follow requirements of the Settement Agreement sections 4.10 and 4.1.1 through 4.1.4. Section 4.10 states "PacifiCorp shall provide for monitoring of performance as provided in Section 9, and make necessary and appropriate Facility Adjustments and Facility Modifications to the Yale and Merwin Downstream Bull Trout Facilities, in Consultation with the ACC and with approval of USFWS, to achieve relevant performance standards as provided in Section 4.1.4 above, provided that such modifications shall not require installation of a different type of passage facility.""PacifiCorp shall follow the provisions in Sections 4.1.1 through 4.1.3 when developing designs for the facilities." Text has been added to section 7 of the Lewis River Bull Trout Fish Passage Plan.
WDFW	49	WDFW believes the current draft non-capacity amendment application review process implemented by the Utilities has not allowed for sufficient, meaningful engagement with the ACC in coordination with the USFWS to consult and review designs ultimately culminating in approval by the USFWS.	The Utilities have provided several opportunities for ACC input. In August of 2019, fish passage engineers provided a presentation to the ACC identifying the conceptual plans for the bull trout fish passage facilities. On August 1, 2019 the conceptual designs were provided to the ACC. On August 29, 2019 WDFW responded with limited comments. WDFW has noted "WDFW does not have major concerns with the preferred alternatives that the Utilities has proposed for the upstream adult collection methods" (May 13, 2020 letter), and noted concerns with the Yale Bull Trout Downstream Fish Passage facility design even though a concept of the facility was approved by WDFW as a signatory to the Settlement Agreement. The agency has not identified any suggestions for improvements to the Settlement Agreement section 4.10.1 Yale Downstream facility. Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will engage the ACC per Settlement Agreement requirements and seek the engagement of the LRBTRT in producing the final facility designs and operations plan, and the requisite monitoring studies.
WDFW	50	On August 1, 2019, the Utilities provided the ACC preliminary draft plans for a 30-day review. WDFW provided some comments on August 29, 2019. WDFW requests that all correspondence be included in full as part of the ACC / TCC Comment Attachment for the plans. In addition, WDFW requests that the ACC correspondence and written communication regarding development of the in lieu decision and plans be included as consultation materials submitted to FERC for the draft non-capacity license amendment applications. WDFW also believes the comments submitted by parties to the Settlement Agreement should be appended as consultation materials to the non-capacity license amendment applications submitted to FERC.	See response to WDFW comment #8
LRBTRT	1	Given that passive, volitional passage (e.g., fish ladders) is not an option for the Lewis River projects due engineering constraints (the height of the projects limit available options) and monetary constraints posed in Section 4.10 of the Settlement agreement, we do not have major concerns with the preferred alternatives PacifiCorp has put forth for the upstream passage solutions (the collection facilities in the Yale Tailrace and the Swift Bypass Reach). However, the downstream solutions need further consideration.	Given the infrastructure of the Lewis River Hydroelectric Projects (high head dams), fish passage with the absence of human-handling (fish ladder) is not feasible from a fish swimming/jumping engineering criteria. Based on this, trap and haul fish passage was identified during the Lewis River FERC relicensing process as the next best means of achieving connectivity between the Projects. Consistent with section 4.10 of the Settlement Agreement, PacifiCorp has included within the Bull Trout Fish Passage Plan conceptual designs for a modular floating Merwin-type collector to be installed just upstream of Yale Dam. Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will engage the ACC per Settlement Agreement requirements and seek the engagement of the LRBTRT in producing the final facility designs and operations plan, and the requisite monitoring studies.
LRBTRT	2	The plan does not provide for realistic collection of subadult/adult bull trout that are attempting to move downstream through the projects. Neither the Swift Floating Surface Collector nor the proposed Merwin-style trap for the Yale forebay are designed to collect adult fish. Further, there is a lot of uncertainty whether a Merwin-style trap will collect any fish, large or small, without attraction flow.	The proposed Yale downstream trap meets the intent of Section 4.10 of the Lewis River Settlement Agreement. The Utilities look forward to working with members of the LRBTRT to help modify this trap and give it the best chance to effectively collect any bull trout that desire to migrate downstream.
LRBTRT	3	Regardless of the type of passage facilities put in place, the LRBTRT strongly recommends that the facilities should be monitored/evaluated for effectiveness via scientifically defensible methods as stated in Section 4.10 and Section 9 of the Settlement Agreement.	Upon issuance of FERC License Amendments requiring the construction of Yale and Swift upstream bull trout fish passage facilities and construction of the Yale downstream bull trout fish passage facility, the Utilities will follow requirements of the Settement Agreement section 4.10 that states "PacifiCorp shall provide for monitoring of performance as provided in Section 9, and make necessary and appropriate Facility Adjustments and Facility Modifications to the Yale and Merwin Downstream Bull Trout Facilities, in Consultation with the ACC and with approval of USFWS, to achieve relevant performance standards as provided in Section 4.1.4 above, provided that such modifications shall not require installation of a different type of passage facility.""PacifiCorp shall follow the provisions in Sections 4.1.1 through 4.1.3 when developing designs for the facilities." Text has been added to section 1 of the Lewis River Bull Trout Fish Passage Plan.
LRBTRT	4	The LRBTRT strongly suggests that sampling protocols (sections V and VI of the Passage Plan), including when sampling occurs (e.g., May – October) and decisions on how and where to transport fish be an adaptively managed process between PacifiCorp and the LRBTRT. To that end, we suggest including a statement in the sampling protocol section of the plan that states, "PacifiCorp will continuously work with the Lewis River Bull Trout Recovery to adaptively manage passage decisions and protocols."	Given the knowledge and expertise of the LRBTRT, the suggested statement has been added to section 5 of the Lewis River Bull Trout Fish Passage Plan.

Cowlitz Indian Tribe	1	The Utilities ignore Section 4.1.9 of the Settlement Agreement, which provides that before an In Lieu alternative can be implemented, there must be (i) a "final" decision of the National Marine Fisheries Service ("NMFS") and the US Fish and Wildlife Services ("USFWS," together with NMFS, "Services"), (ii) based on material "new information," that (iii) demonstrates that the agreed fish passage facilities are "inappropriate." USFWS and NMFS issued only a "preliminary determination," and the amendment application includes no "new information" demonstrating that environmental conditions have signficantly changed since FERC's grant of the license such that it supports a conclusion that the fish passage measures are "inappropriate."	Section 4.1.9 of the Settlement Agreement does not require a "final" determination from the Service before the Utilities file an application for non-capacity amendments to their hydropower licenses. (i) The Settlement Agreement (including § 4.1.9) does not require a "final" decision by NMFS or USFWS. The anticipated process for the Services' final determination is set forth in response to NMFS comment #6. (ii) The Settlement Agreement only stipulates that New information is to be presented to the Services, who will then make a determination from that New Information. The Services issued preliminary determinations on April 11 and 12, 2019. Recommendations were provided or not provided, in accordance with the Settlement Agreement terms in § 4.1.9. (iii) It is within the Services purview to determine the appropriateness of fish passage, per § 4.1.9(b) of the Settlement Agreement. The Services determined that the new information received did not warrant the implementation of fish passage measures. The Settlement Agreement does not require that the New Information utilized by the Services to support their fish passage determination reflect an environmental change. Rather, the New Information must be information that was unavailable at the time of the execution of the Settlement Agreement. The New Information utilized by the Services in making their fish passage determinations is comprised of new analysis of fish productivity, represents the best available science, and demonstrates that fish passage is inappropriate. A final decision is required to implement the In Lieu alternative. However, filing of the license amendment applications is not implementing the In Lieu alternative. Instead, filing of the license amendment applications is the first step in obtaining a final decision on the New Information which is the basis of the Services' preliminary decisions.
Cowlitz Indian Tribe	2	The determination by the Services is just an economic and political decision based on a different set of priorities.	The New Information utilized by the Services in making their fish passage determinations is comprised of new analysis of fish productivity, represents the best available science, and demonstrates that fish passage is inappropriate.
Cowlitz Indian Tribe	3	The Utilities' conclusion in their license amendment application that "ongoing and proposed delays in instituting fish passage throughout the Lewis River basin do not cause material harm to ESA-listed salmon and steelhead populations, and by extension, the Cowlitz people, and therefore, no mitigation is needed" is unsupported, unlawful, and unreasonable.	The Utilities have included an analysis of the effects of Services' delay in making a fish passage determination for the Yale reservoir in Section E.4.1.1.1 of Exhibit E. These impacts are also evaluated in the biological assessments prepared for the applications. The analysis showed that even with the delay at Yale, the Merwin In-Lieu Program was expected to produce salmon populations with sufficient productivity and abundance to meet recovery biological objectives for all three species as long as the fish collection efficiency (FCE) of the juvenile bypass system is approximately 60 percent or greater, which is substantially below the Settlement Agreement required FCE for Swift (95 percent).
Cowlitz Indian Tribe	4	The Utilities' conclusion in their license amendment application that "Short- and long-term impacts to ESA-listed populations are limited to those caused by in-lieu habitat restoration, and forgone benefits of fish passage (as agreed in the 2004 Settlement Agreement) do not warrant consideration" is unsupported, unlawful, and unreasoanble."	Cowlitz cannot reasonably draw the conclusion from the Utility's license amendment application that "the foregone benefits of fish passage do not warrant consideration." Nowhere in the application is such an opinion stated. The regulations do not require that the environmental report provide an analysis of any forgone benefit from previously a planned mitigation measure that is being replaced with the current mitigation measures captured in the license amendment.
Cowlitz Indian Tribe	5	The Utilities' conslusion in their license amendment application that "The Merwin In-Lieu Strategic Plan ("Strategic Plan") meets the threshold of 22.5 kilometers of stream habitat restored to "template" or pristine conditions as stipulated by the National Marine Fisheries Service ("NMFS") in its April 11, 2019 communication" is unsupported, unlawful, and unreasonable.	The $21 million of in-lieu funds is sufficient to conduct restoration work in approximately 41 miles (66 km) of stream habitat upstream of Swift Dam. This is based on the assumption provided by representatives of the Lower Columbia Salmon Recovery Board that to fully restore a mile of stream habitat will cost $500,000. Thus, resulting fish production is expected to be higher than NMFS estimates. Because projects to be implemended with in-lieu funds have yet to be precisely defined, the EDT analysis was conducted by setting habitat conditions where actions may occur to Template conditions, as defined in EDT. The resulting EDT estimate of fish production from this habitat work exceeds the expected fish production from stream habitat (9.5 km) between Merwin Dam and Yale Dam. The working assumption is that the restoration of 66 km of stream will produce more fish than 9.5 km of unrestored habitat in Merwin to Yale.
Cowlitz Indian Tribe	6	The Utilities' conclusion in their license amendment application that the "In-lieu habitat restoration projects can instantaneously restore "template" or pristine conditions used to model adult salmon and steelhead abundance numbers in the proposed restoration treatment of the identified stream reaches with approaches identified in the Strategic Plan" is unsupported, unlawful, and unreasonable.	EDT modeling results are simply a forecast of expected fish production after implementation of habitat actions. Modeling does not predict when these actions reach full effectiveness. However, because the restoration work will focus on LWD placement, side-channel and floodplain developement, their effect on fish production is expected to occur immediately after implementation.
Cowlitz Indian Tribe	7	The Utilities' conclusion in their license amendment application that "a modest, hypothetically-modeled, delayed increase in the abundance of salmon and steelhead within the Lewis River basin is adequate mitigation for a loss in overall viable salmonid population (VSP) parameters for salmon and steelhead (i.e., population abundance, productivity, distribution, and diversity) that would have been realized by implementing contiguous fish passage through the Lewis River basin as agreed in the 2004 Settlement Agreement" is unsupported, unlawful, and unreasonable.	A comparison of VSP parameters for full fish passage, habitat restoration upstream of Swift, and mutiple others, was developed and the results presented in: Review of Lewis River Hydroelectric Project fish passage alternatives and recommendations of Utilities. PacifiCorp and Cowlitz PUD 2018. The data in Table 1 of this document show that the full fish passage alternative (#2) performed the poorest for all alternatives modeled for abundance, productivity and life history diversity. However it did have one of the highest spatial structure scores as fish have access to additional habitat.
Cowlitz Indian Tribe	8	The Utilities ' conclusion in their license amendment application that "the proposed monitoring plan can validate the effectiveness of in-lieu habitat restoration projects in meeting or exceeding the population-level benefits expected from fish passage as directed by the NMFS April 11, 2019 communication" is unsupported, unlawful, and unreasonable.	The bar is offsetting fish production associated with Merwin habitat. Utilities maintain the population level monitoring of smolts, while not perfect given the time frame and lack of long-term pre-project data, does address what was requested. Determining the adult response is difficult given fish reintroduction is still ongoing and the number of adults are still largely composed of hatchery fish. Maintaining a relatively constant number of fish during the In Lieu Restoration Program, will help determine the juvenile and smolt response to restoration. Moreover, looking at the number of effective breeders and smolts per breeder will provide population level information on adult reproductive success.
Cowlitz Indian Tribe	9	Cowlitz requests, pursuant to 18 .C.F.R. 4.38(c)(6)(i) that the Utilities hold a joint meeting within 60 days of submission of these comments between the Utilities, the Tribe, and other agencies with similar or related areas of interest, expertise, or responsibility to discuss and attempt to reach agreement on its plan for environmental protection, mitigation, or enhancement measures.	Before filing a non-capacity license amendment application, the applicant must consult with the resource agencies and Tribes by, at a minimum, providing the resource agencies and Tribes with copies of the draft non-capacity license amendment application and allowing them at least 60 days to comment on the proposed amendment. 15 C.F.R. § 4.38(a)(7). The regulations do not require a joint meeting within 60 days of submission of the resource agencies' and Indian Tribes' comments on a non-capacity license amendment application. The pre-filing consultation process for certain applications enumerated in 18 C.F.R. § 4.38(a)(6) are not applicable to this non-capacity amendment.

Cowlitz Indian Tribe	10	Cowlitz incorporates by reference "the entirety of those comments" it previously submitted on the fish passage throughout the Lewis River, which "have spanned many years and involved materials beyond those included or referenced by the license applications."	See response to WDFW comment #8
Cowlitz Indian Tribe	11	The Alternative Dispute Resolution and related comments and issues that were previously raised during that process by the Tribes were not, as required, acknowledged in the draft license amendments, nor attached to the applications. Therefore, the applications are incomplete.	See response to WDFW comment #8
Cowlitz Indian Tribe	12	Once the license amendment applications are revised, they must be re-submitted to all Settlement Agreement parties for another 90-day review and comment period.	The pre-filing consultation requirements do not require res ubmission to pre-filing consultation parties and a new 90-day comment period. Under 18 C.F.R. 4.38(a)(7), commenters must receive "at least 60 days" to comment on the proposed non-capacity related amendment. Here, the commenters received an additional month of time because the Utilities concluded that non-Utility interested parties should receive the same amount of notice the Utilities would receive under Section 15.3.2 were the Utilities subjected to a reopener process.
Cowlitz Indian Tribe	13	The draft license amendment application is inconsistent with the Settlement Agreement and should not be submitted to FERC until the Settlement Agreement has been amended in accordance with the Settlement Agreement's terms. Once the Settlement Agreement has been amended, then the license amendment application must be revised to comply with the revised Settlement Agreement. P. 3/13; The Utilities in their 4/22/19 filing to FERC claim that "no amendment to the Settlement Agreement is required."	See response to USFS comment #1
Cowlitz Indian Tribe	14	The Utilities' implication that November 2011 was the initiation of a collaborative effort between it and the Settlement Agreement parties to develop new information evaluating if fish passage was appropriate is false.	Collaboration Commenced in 2011: A detailed description of the consultation with the ACC during preparation of the New Information that commenced in 2011 is included in Exhibit E of the application. Please also see Appendice to Exhibit E - Consultation Record.
Cowlitz Indian Tribe	15	The best available science shows the fish passage facilities and measures remain as appropriate today as the day the Settlement Agreement was signed.	Utilities disagree. Please see Application for License Amendment documents which demonstrate the greatest gain towards the Lewis River Settlement Agreement Reintroduction Outcome Goal is implementing the Services April 2019 Preliminary Decisions over constructing fish passage into Merwin Reservoir.
Cowlitz Indian Tribe	16	The standard used by the Utilities for evaluating if the in-lieu proposal is warranted is not if the new information deems the fish passage "appropriate," but rather whether the new information deems the fish passage requirement "inappropriate" under Section 4.1.9 of the Settlement Agreement.	The term “inappropriate” is not defined in the Settlement Agreement, the Endangered Species Act or the Federal Power Act. In circumstances such as this, where a term is undefined by the contract or statute, it is appropriate to assign those terms their ordinary meaning, and courts typically refer to dictionary definitions to ascertain the ordinary meaning of undefined terms. The term “inappropriate” is defined in the Oxford English Dictionary as “not suitable or proper in the circumstances” and in Webster’s Dictionary as “not appropriate; unsuitable.” In the context of the Settlement Agreement, if actions relating to the aquatics program will not best support “genetically viable, self-sustaining, naturally reproducing, harvestable populations” above Merwin Dam, they are inappropriate. The New Information shows that habitat restoration available through the in-lieu mitigation program contemplated by the Settlement Agreement provides greater benefits to listed species than fish passage.
Cowlitz Indian Tribe	17	The Service failed to clear the high bar of determining the fish passage requirement "innappropriate" in their "preliminary determination" on fish passage on 4/11/19 and 4/12/19; the Service's determination that there are comparable fish population benefits between fish passage and habitat restoration and that habitat restoration is 85M cheaper was effectively a cost-benefit finding and not a finding that environmental conditions have changed since FERC's issuance of a license such that it would render the construction of the fish passage "inappropriate."	See response to Cowlitz Indian Tribe comment #16
Cowlitz Indian Tribe	18	There is no indication that the "new information" provided has indicated that the environmental conditions have significantly changed since FERC's issuance of the license in a manner that would render the construction of the fish passage facilities "inappropriate."	Utilities disagree. Per section 4.9.c of the Lewis River Settlement Agreement: ""New Information"is defined as information relevant to anadromous fish reintroduction and fish passage, including that presented by any Party, and provided to the Services and the Licensees. The Licensees must provide copies of such New Information to all the members of the ACC. **This information may include, but is not limited to (*emphasis added*)**: (1) Experience with upstream fish collection and transport facilities at other sites, including Merwin Dam. (2) Experience with downstream fish collection facilities at other sites, including Swift No. 1 Dam. (3) Experience with the reintroduction efforts of spring Chinook, coho, and steelhead above Swift No. 1 Dam. (4) Consideration of broader contextual information beyond the Lewis River Basin, including regional anadromous fish recovery efforts. The Utilities have collected, shared, reported and presented to the ACC an abundance of New Information to inform the Services Decision process. As described in the Applications for License Admendments, a greater gain can be achieved towards the Lewis River Settlement Agreement Reintroduction Outcome Goal from implementing the Services April 2019 Preliminary Decisions over construction of fish passage into Merwin Reservoir.
Cowlitz Indian Tribe	19	The Utilities and the Service have failed to work to extend the timeline established in the Settlement Agreement and licenses to initiate design, permitting, and construction of fish pasage facilities or the in-lieu proposal beyond April 12, 2019, and they also are delaying a decision on the appropriateness of a fish passage for the Yale Reservoir for up to 10 years, all of which will cause unmitigated harm to ESA-listed species in the Lewis River basin.	See the response to Cowlitz Indian Tribe comment # 3. In addition, the Utilities have engaged with the Tribes and other members of the ACC regarding the New Information that supports the Services' preliminary determinations. A summary of this multi-year consultation is included as an Appendix to Exhibit E.
Cowlitz Indian Tribe	20	Exhbit E of the draft license amendment fails to satisfy 18 C.F.R. 4.51(f)((3) by failing to adequately evaluate the impacts of the proposed amendments by ignoring the abandonment of full fish passage throughout the Lewis River basin, a centerpiece of the Settlement Agreement and 2008 licenses, and instead only evaluating the impacts of in-lieu actions.	18 C.F.R. 4.51(f)(3) requires "(i) **a description of** the fish, wildlife, and botanical resources of the project and its vicinity, and of **downstream areas affected by the project**, including identification of any species listed as threatened or endangered by the U.S. Fish and Wildlife Service, [...] (iv) **a description of any anticipated continuing impact on fish, wildlife, and botanical resources of continued operation of the project, and the incremental impact of proposed new development of project works or changes in project operation**..." These provisions do not require a comparison of the wildlife impacts between the proposed license amendment's impacts versus the current license's status quo impacts; rather, the regulations only require descriptions of the impact of the new license amendment. However, the data provided in the New Information report provided to the Services pursuant to Section 4.1.9 of the Settlement Agreement demonstrated that the mitigation measures associated with the In-Lieu Program wicess. As described in the Applications for License Admendments, a
Cowlitz Indian Tribe	21	The in-lieu strategic plan proposal to take place off-site will not mitigate the damage caused to the salmon and steelhead populations in the Yale and Merwin Reservoirs such that the fish actually become reintroduced.	Utilities disagree. Please see response to Cowlitz Indian Tribe comment #7 and Application for License Amendment documents which demonstrate a greater gain can be achieved towards the Lewis River Settlement Agreement Reintroduction Outcome Goal from implementing the Services April 2019 Preliminary Decisions over construction of fish passage into Merwin Reservoir.

Cowlitz Indian Tribe	22	By ignoring the no-action alternative of fish passage, the Utilities avoid acknowledging that even with extremely optimistic modeling assumptions supporting habitat restoration, the NMFS estimates provided in Table 2 clearly indicate that reintroduction will provide greater salmon and steelhead abundance for all species than would the in-lieu restoration plan. 7/13.	The data in NMFS Table 2 reflect expected fish production with the restoration of 22.5 km of habitat upstream of Swift Dam. The 22 km value is based on a restoration cost of $875,521 per km. The vast majorty of the cost ($518,400) was for riparian improvement which is not proposed to be a major action due to exisiting riparian conditions upstream of Swift. Removing riparian restoration costs, reduces total expenditures per mile of habitat to $357,000 per km or $575,000 per mile. This is close to the $500,000 per mile assumption provided by staff from the LCFRB which is being used for initial cost estimates. Thus, at a cost of $500,000 per mile, the $21 million of in-lieu funds will restore ~40.8 miles (66 km) of stream habitat which is 41.5 km more than the NMFS estimate. Therefore, the increase in salmon abundance is expected to be substaintailly higher than what NMFS estimated. Additionally, the data in Table 2 referenced reflect Yale fish production and not Merwin. NMFS is delaying the decision to implement fish passage at Yale until habitat results are known. NMFS will use these results to determine if passage should be put in at Yale or if the Yale in-lieu fund consisting of an additional $21 million should be spent on habitat improvements.
Cowlitz Indian Tribe	23	The NMFS calls the fish abundance from the in-lieu restoration plan into question.	Habitat restoration is a proven, viable and valid method to increase production of salmon and steelhead in river reaches where functioning aquatic habitat is not at full potential. Compared to providing fish passage into Mewin Reservoir, the alternative of implementing the Merwin In-Lieu ($21 million) action will provide a larger increase in fish abundance. Please see Exhibit E section E.4.1.1.1 for a comparison of these two alternatives.
Cowlitz Indian Tribe	24	Full fish passage remains the most beneficial action that can be undertaken for salmon and steelhead, and therefore remains "appropriate" and should be implemented as soon as practicable.	See response to Cowlitz Indian Tribe comment #7
Cowlitz Indian Tribe	25	Tribe disputes that the in-lieu strategic plan measures will result in "comparable" or "superior" benefits as the fish passage proposal.	No scientific evidence has been provided by the Tribe to support their claim that fish passage into Merwin Reservoir and Yale Reservoir best meets the Settlement Agreement Reindtroduction Outcome Goal for salmon and steelhead.
Cowlitz Indian Tribe	26	In support of abandoning the fish passage proposal, the Utilities rely on the restoration project's ability to restore 22.5 kilometers of stream habitat to "template conditions" or "historic conditions" that would effectively require a roll-back of decades of impacts.	Because projects to be implemented with in-lieu funds have yet to be precisely defined, the EDT analysis was conducted by setting habitat conditions where actions may occur to Template conditions, as defined by EDT. The bullet points describe benefits expected to occur with habitat improvements. These benefits are consistent with improvements to stream habitat that would occur with restoration to Template conditions.
Cowlitz Indian Tribe	27	The Strategic Plan falls short of the promises made by the Utilities and upon which the Services issued their preliminary determination. The project examples in the Strategic Plan are illustrative; Project EF 05 was developed to a conceptual design level by 2009, but has yet to be fully designed, permitted, or constructed, in spite of being one of the highest priority projects identified in the "Lower East Fork Lewis River Habitat Restoration Plan." It is a site-specific habitat-creation project that does not attempt to restore habitat function or process, did not consider landowner needs or interests, is very expensive for the expected habitat benefits (roughly $3,000 per linear meter in 2009 dollars), and has not been completed. The Utilities did not provide any examples of large-scale projects, or projects that intend to restore template conditions, or projects that were implemented or could be implemented within the dollars-per-kilometer figure available through the in-lieu fund.	Project examples shown in the Appendix are intended to be illustrative; A1 (Upper Sanpoil), and A2 (Wind River) are elements of large scale programs and therefore more representative of actions likely to be implemented in the upper Lewis River Basin upstream of Swift Dam. A-3 is a local, lower watershed project and based on these comments has been removed from the Strategic Plan.
Cowlitz Indian Tribe	28	the Strategic Plan fails to adequately explain how the Utilities would ensure that the in-lieu fund outcomes would be tied directly to the impacts of the projects it is meant to mitigate. Forgoing fish passage to Merwin Reservoir substantially reduces the spatial diversity of salmon and steelhead populations; the actions roughly outlined in the Strategic Plan would attempt to incrementally improve currently occupied and functional habitat in the upper Lewis River basin. These actions are not directly tied to one another: even if the Utilities' proposed habitat improvements were to improve habitat quality, they cannot increase spatial diversity or other salmon and steelhead population attributes impacted by forgoing fish passage to Merwin Reservoir and its tributaries.	While foregoing fish passage into Merwin Reservoir impacts spatial diversity of salmon and steelhead, that loss is not substantial. Currently the North Fork of the Lewis River provides 92.5km, 124.3km and 125.4km of spring Chinook, Coho and steelhead spawning habitat. The amount of spawning habitat associated with Merwin Reservoir is 9.485km for steelhead and Coho, and 0km for spring Chinook. Actions (fish passage or in-lieu) of the Lewis River Settlement Agreement were identified with the intent of achieving the Settlement Agreement Reintroduction Outcome Goal. While the actions may support the Recovery Plan, the Settlement Agreement was not specifically designed for the sole purposes of the Recovery Plan.
Cowlitz Indian Tribe	29	PacifiCorp owns the vast majority of shoreline as well as the lower extents of tributaries to Merwin Reservoir and has management responsibility for those habitats. This ensures that habitats on which reintroduced salmon and steelhead would continue to be managed for their benefit. The Strategic Plan shifts long-term responsibility for managing habitat to the Forest Service and other upstream landowners without adequately explaining or supporting how this long-term approach would be supported financially or jurisdictionally. The long-term habitat management and outcomes for the river reaches targeted for restoration under the Utilities' proposed license amendments are therefore outside of the Strategic Plan's purview, PacifiCorp's control, and the Commission's oversight.	Cowlitz Indian Tribe fails to note where in the Strategic Plan the Utilities "shift" long-term responsibility for managing the habitat to the U.S. Forest Service and other upstream landowners, nor explain how such an action fails to be supported "jurisdictionally." In fact, the Strategic Plan actually notes that "[p]revious restoration work in the Lewis River watershed has been completed by the U.S. Forest Service, Lower Columbia Fish Recovery Board (LCFRB), Cowlitz Indian Tribe, Washington Department of Fish and Wildlife, Lower Columbia Fish Enhancement Group and Fish First." Thus, any involvement in restoration work by the Forest Service is not new. The Strategic Plan makes clear that the Utilities, as owners of the projects, are ultimately responsible for the restoration actions and ensuring they comply with the licenses and applicable requirements . The fact that the Utilities will engage a Program Administrator to facilitate and implement the Mewin In Lieu Program does not equate to the Utilities "shifting" responsibility of managing the habitat long term.
Cowlitz Indian Tribe	30	The Strategic Plan outlines potential permitting pathways but does not indicate whether the Forest Service would allow or could accommodate the habitat restoration actions under their land management regime and regulations. The Tribe has partnered with the Forest Service on a number of habitat restoration projects, and can attest to the administrative difficulty of implementing modest, site-scale habitat projects on Forest Service lands, let alone landscape-scale changes indicated by the NMFS preliminary determination. The Forest Service has previously expressed written concerns regarding implementing in-lieu restoration projects on federal lands, but these concerns remain unaddressed by the Utilities and the Services.	See response to Cowlitz Indian Tribe comment #29.
Cowlitz Indian Tribe	31	The Utilities currently operate an annual grant round to administer the Lewis River Aquatic Fund established in the 2008 licenses. This account is chronically underspent, in large part because feasible, high-benefit, low-risk projects on Forest Service lands and elsewhere in the Lewis River basin have eluded identification and implementation, despite over a decade of work to identify and prioritize reaches and projects. The idea that additional funding and bureaucracy (detailed below) would solve this problem and open the floodgates for feasible, high-benefit, landscape-scale restoration defies logic.	Per comments recieved from the Cowlitz Indian Tribe, Lower Columbia Fish Recovery Board and Washington Department of Fish and Wildlife, the Strategic Plan process to identify and then implement aquatic habitat projects has been streamlined. This process is much much different that the current Aquatic Fund process annually implemented by the ACC. The Strategic Plan does not create bureaucracy but rather ensures all tasks are being performed by those specialized in the area to guarantee the utmost quality assurance and will result in an efficient implementation as a result of these dispersed tasks.

Cowlitz Indian Tribe	32	The Strategic Plan fails to show how implementation could be completed quickly, as would be necessary for measuring success in time to inform the Services' decision on Yale (see comments on Monitoring Plan, below). Instead, the Strategic Plan lays out a well-worn approach to develop a multi-layer bureaucratic grant or contract program to outsource the identification, design, permitting, and implementation of landscape-scale restoration projects by unidentified agents. This is similar to the above-mentioned Aquatic Fund, in which the ACC, Services, and Utilities evaluate project proposals, but with additional layers of coordination and review by an unnamed "Program Administrator" with whom the Utilities intend to contract, and a to-be-formed "Technical Advisory Committee." These additional layers of review and process will slow the pace of implementation. Uncertainty regarding the capability and capacity of the Program Administrator and potential contractors increases the risk of program failure.	See response to Cowlitz Indian Tribe comment #31.
Cowlitz Indian Tribe	33	The Lewis River Basin Implementation Monitoring Plan ("Monitoring Plan") is inaequate because it fails to inform a deferred decision on fish passage to/from Yale Reservoir. The sole goal of the Monitoring Plan should be to validate the modeled population-level increase in abundance directly attributable to in-lieu habitat restoration actions within the 10-year delay proposed to evaluate the in-lieu program's effects. Instead, the Utilities' Monitoring Plan acknowledges that their population-level promises cannot be robustly validated with their proposed methods in the short timeline proposed in the license amendment applications. Indeed, these would be the first such robust, positive, large-basin results in the 40+ year history of river restoration monitoring conducted in the region, irrespective of the time available for monitoring.	Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by time.
Cowlitz Indian Tribe	34	The scaled-down bull trout passage plans provided in lieu of multi-species upstream and downstream fish passage facilities does not provide equivalent benefits to anadromous, adfluvial, and fluvial life history strategies naturally displayed by bull trout populations throughout their range. Specifically, the lack of attraction flow proposed for use in the Yale forebay trap virtually assures that bull trout seeking a downstream pathway will be stymied. Similarly, the Swift Floating Surface Collector has not been demonstrated to effectively capture downstream migrating adults, such as bull trout and downstream-migrating steelhead kelts. Instead, monitoring data provided to the ACC has indicated that larger fish are temporarily attracted or entrained in the attraction flow, and then easily extricate themselves from the trap entrance with their superior burst speed. Without substantial engineering improvements, bull trout will continue to be sequestered within their current distributions in Yale and Swift reservoirs and tributaries, and the primary threat of lack of connectivity will continue to pose a threat to their populations.	The Utilities maintain the proposed Yale downstream collector design follows the intent of the Lewis River Settlement Agreement Section 4.10, which states the facility shall be similar in magnitude and scale as a modular floating Merwin-type collector and is not intended to be a passage facility of the same magnitude and expense as the Swift Floating Surface Collector. The Utilities will adaptively manage the proposed downstream bull trout facilities, in consultation with the USFWS, ACC and the LRBTRT, to capture bull trout adults and sub-adults as safely and effectively as possible under the proposed design. PacifiCorp continues to seek to improve the Swift Floating Surface Collector collection efficencies for transported species. Over the years, facility improvements have been made increasing the collection efficency for coho, spring Chinook and steelhead. Additional projects are being planned for continuous improvement. It is expected that facility improvements for salmon and steelhead will increase bull trout collection.
Yakama Nation	1	The proposed license amendments will not provide for adequate mitigation for injured Endangered Species Act-listed salmon and steelhead populations in the Lewis River basin.	As described in the environmental report in accordance with 18 C.F.R. 4.51(f)(1), "the majority of the land subject to the license amendment is managed for wildlife habitat as mitigation for the construction of and continued operation of the hydroelectric projects." Exhibit E. NMFS has also stated that there are comparable fish population benefits between fish passage and habitat restoration. The Tribe fails to explain how this proposed license amendment's mitigation is inadequate (see NMFS April 11, 2019 letter, p.3).
Yakama Nation	2	The delay in implementation and proposed elimination of the contiguous fish passage through the basin as described in the Settlement Agreement and subsequently in the 2008 renewal for Merwin, Yale, Swift No. 1, and Swift No. 2 hydroelectric facilities ("Faciltiies") licenses is unacceptable and cannot be reconciled with the Settlement Agreement.	The New Information utilized by the Services in making their fish passage determinations is comprised of new analysis of fish productivity, represents the best available science, and demonstrates that fish passage is inappropriate.
Yakama Nation	3	Continued delay in implementation and elimination of fish passage throughout the Lewis River basin constitutes material harm to ESA-listed salmon and steelhead populations, and by extension, Yakama Nation's inherent and reserved right to pursue its cultural, subsistence, ceremonial, and economic fishing activities in the Columbia River fishery.	See the response to Cowlitz Indian Tribe comment # 3.
Yakama Nation	4	The Settlement Agreement procedures for informal dispute resolution were invoked in 2019 by multiple parties, including Yakama Nation as a participant, and the disputed In-Lieu Proposal has not been resolved yet either through the resolution process or by amendment to the Settlement Agreement.	Per the NMFS's February 7, 2020 letter, it requested that the Disputants notify NMFS if it would like a second ADR meeting scheduled in April 2020, and that if no further interest of such is indicated by March 1, 2020, then NMFS will consider the informal ADR process that took place in the summer and fall of 2019 to have been completed. Therefore, the ADR process has concluded.
Yakama Nation	5	The NMFS and U.S. Fish and Wildlife Service have not finalized their "preliminary determination" on the proposed In-Lieu plan for "appropriate" elements as required under the Settlement Agreeement's prescribe process.	See response to NMFS comment #6
Yakama Nation	6	The In-Lieu Proposal fails to sufficiently demonstrate that the threshold of 22.5km of "template" condition stream habitat can actually be restored to achieve its theoretical mitigation targets.	Utilities disagree. Please see response to Cowlitz Indian Tribe comment #7 and Application for License Amendment documents which demonstrate a greater gain can be achieved towards the Lewis River Settlement Agreement Reintroduction Outcome Goal from implementing the Services April 2019 Preliminary Decisions over construction of fish passage into Merwin Reservoir.
Yakama Nation	7	The proposed monitoring plan fails to demonstrate that it will be able to validate the effectiveness of proposed In-Lieu habitat restoration projects in actually achieving targeted population-level benefits in-lieu of the current Settlement Agreement requirement for fish passage, which compounds Yakama Nation's concern that the In-Lieu Proposal erodes mitigation standards for the Utilities' Facilities.	Because of uncertainty in determining population level response in the given time frame, the Monitoring Plan includes rerunning EDT model before and after restoration to confirm whether the habitat will support the number of adults or lead to the level of increase predicted by the EDT model. Text has been clarified that the results of the modeling and population level monitoring will be compared to predictions from original EDT model as well as analyzed statistically.
Yakama Nation	8	The Yakama Nation requests under 18 C.F.R. 4.38(c)(i)(6)(i), that the Utilities hold a joint meeting within 60 days of submission of these comments between the Settlement Agreement parties to continue the ongoing Settlement Agreement prescribed procedures for dispute resolution reach an equitable agreement on the proposed plans for environmental protection, mitigation, or enhancement measures between the Settlement Agreement Parties.	See response to Cowlitz Indian Tribe comment #9

Yakama Nation	9	The next critical phase under the Settlement Agreement's dispute resolution terms requires the Services to finalize their "preliminary determination" regarding future proposed amendments to the existing Settlement Agreement Lewis River fish habitat restoration plan. The Utilities' draft license amendment applications are premature and serve to restrict Yakama Nation's participation under the Settlement Agreement. [...] It is improper for the Utilities to attempt to implement the In Lieu Proposal, contrary to the Settlement Agreement, while the Settlement Agreement parties dispute the In Lieu Proposal and the Services preliminary determinations are not finalized.	See response to NMFS comment #6
Yakama Nation	10	The Services did not determine that Facility fish passage was "inappropriate" in their "preliminary determinations," dated April 11 and 12, 2019.	See response to Cowlitz Indian Tribe comment #16
Yakama Nation	11	The In-Lieu Proposal fails to implement sufficient habitat mitigation, because the In-Lieu Proposal's target of restoring 22.5 km of stream habitat to "template" conditions exaggerates achievable mitigation. This is an impossible task. […] template conditions would reuqire rolling back the effects of 1980 eruption of Mt. St. Helens and instantly growing 300-year old forests on the riverbanks [...] and require the presence of old-growth riparian forest that has since been lost to the collecting impacts of over a century of volcanism, intensive forest management, mining, logging, recreation, stream clearing, and the upstream impacts of the hydropower projects.	Funds are available to restore 66km of habitat upstream of Swift Dam. Because projects have not been clearly defined, the analysis assumes that reaches can be restored to EDT defined template conditions. No actions are proposed in the Muddy River which was heavily impacted by Mt. St. Helens.
Yakama Nation	12	The draft license amendment application fails to provide adequate information demonstrating that in-lieu work is sufficient replacement for full fish passage.	See response to Cowlitz Indian Tribe comment #7
Yakama Nation	13	The monitoring plan is insufficient to validate the effectiveness of the in-lieu habitat restoration plan because it does not attempt to address population-level effects of habitat restoration. […] eliminating full fish passage without developing a methodology to robustly validate the modeled population-level increase in fish abundance directly attributable to the in lieu habitat restoration actions means that any future determination regarding "appropriate" or "inappropriate" mitigation lacks a foundational basis against the current Settlement Agreement facility passage requirements.	Because of uncertainty in determining population level response in the given time frame, the Monitoring Plan includes rerunning EDT model before and after restoration to confirm whether the habitat will support the number of adults or lead to the level of increase predicted by the EDT model. Text has been clarified that the results of the modeling and population level monitoring will be compared to predictions from original EDT model as well as analyzed statistically. A discussion has been added of other models in particular the method used in Appendix B of PacifiCorp (2016), which is based on empirical estimates of increases in salmon and steelhead from published studies on restoration effectiveness. This included a Monte Carlo simulation with predicted increases for all In Lieu Restoration which were similar to predictions from the EDT model. These numbers can be compared to those from the reach-scale fish monitoring to confirm whether the restoration is leading to expected increases and reported in other studies.
Lower Columbia Fish Recovery Board	1	The Services and Utilities have not "materially addressed" LCFRB's concerns from its June 10, 2019 dispute letter.	The Utilities disagree. LCFRB's concerns from its June 10, 2019 letter were materially addressed during ACC consideration of the Services' in-lieu decisionmaking. Nevertheless, 18 C.F.R. 4.38(a)(7) outlines the pre-filing consultation requirements for non-capacity related license amendments. The Pre-filing consultation regulations do not require the Utilities to re-address concerns raised prior to pre-filing consultation during a dispute resolution process that takes place under a settlement agreement. The Utilities have noted times of notice, feedback, comments, and recommendations relating to the in-lieu evaluation and decision-making process, preliminary determination, and dispute processes to their license amendment applications. Please see Appendix to Exhibit E - Consultation Record.
Lower Columbia Fish Recovery Board	2	If FERC grants Utilities' proposed license amendments, they will be inconsistent with the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan ("Recovery Plan") and the Settlement Agreement.	The Utilities disagree. LCFRB fails to explain how the amended licenses would be inconsistent with either the Recovery Plan or the Settlement Agreement. The directed purpose of the Lewis River fish passage program and proposed in lieu funding is to achieve the Lewis River Settlement Agreement Reintroduction Outcome Goal; the Utilities are not required to complete Hydro actions identified in the Recovery Plan. Implementation of actions towards the Reintroduction Outcome goal will support the Recovery Plan. The Utilities maintain the license amendment applications, if granted, would be consistent with the goals and objectives of the Recovery Plan and would provide a greater gain towards the Settlement Agreement Reintroduction Outcome Goal versus providing fish passage into Merwin Reservoir.
Lower Columbia Fish Recovery Board	3	The Utilities' draft applications are incomplete. The disputing parties' disputes are not included or addressed in the draft FERC license amendment documents submitted for review. Not including the disputing parties' disputes, including prior recommendations and comments on the in-lieu determination process is contrary to the "spirit and intent" of FERC's license amendment application regulations.	See response to WDFW comment #8
Lower Columbia Fish Recovery Board	4	To remedy the incomplete applications, the Utilities should "formally withdraw" their "requests" and revise to include (1) copies of feedback, comments, and recommendations relating to the in-lieu evaluation and decision-making process, preliminary determination, and dispute processes and (2) a detailed response from the Utilities to objections, concerns, and recommendations provided by the disputing parties to date.	See response to WDFW comment #8
Lower Columbia Fish Recovery Board	5	Once the draft application is amended, it should be resubmitted for review with a new comment period.	See response to Cowlitz Indian Tribe comment #12
Lower Columbia Fish Recovery Board	6	Exhibit E fails to analyze potential environmental impacts caused by delaying an in-lieu determination as to upstream and downstream passage into and out of Yale Reservoir until 2031 and 2035.	See the response to Cowlitz Indian Tribe comment # 3.
Lower Columbia Fish Recovery Board	7	An analysis of potential environmental impacts from the delay should include an include evaluation of reduced and deferred gains in Viable Salmonid Population (VSP) parameters (abundance, productivity, spatial distribution, and diversity).	See the response to Cowlitz Indian Tribe comment # 3.
Lower Columbia Fish Recovery Board	8	An analysis of potential environmental impacts from the delay should also include evaluation of impacts at the population, strata, and Evolutionarily Significant Unit (ESU) scales in relation to the overall and individual recovery action implementation schedule established in the Recovery Plan.	See the response to Cowlitz Indian Tribe comment # 3.

Lower Columbia Fish Recovery Board	9	Exhibit E should also include a description of any measures to mitigate impacts from the delay, including temporal losses of function, on ESA-listed fish.	See the response to Cowlitz Indian Tribe comment # 3. 18 C.F.R. 4.51(f)(3)(ii) requires that a description be included in the environmental report that summarizes measures recommended by agencies consulted for the mitigation of impacts on fish, wildlife, and botanical resources, or for the protection or improvement of those resources, as well as a statement of any existing measures to be continued or maintained and any measures proposed by the applicant for the mitigation of impacts on fish, wildlife, and botanical resources, or for the protection or improvement of such resources, including an explanation of why the applicant has rejected any measures recommended by an agency under paragraph (f)(3)(ii). In Exhibit E , it summarizes the existing measures to be continued for mitigation pending the fish passage decision into Yale reservoir, which is a "partial passage" provided that allows "for upstream passage from Merwin Dam to upstream of Swift Dam and allowing for downstream passage from Swift Dam to downstream of Merwin Dam."
Lower Columbia Fish Recovery Board	10	Exhibit E should explain why the Utilities have rejected the recommendations provided by resource agencies and Tribes consulted on this matter to date regarding reintroduction.	Code of Federal Register 4.51(f)(3)(ii) requires the environmental report include a "description of any measures or facilities recommended by the agencies consulted for the mitigation of impacts on fish, wildlife, and botanical resources, or for the protection or improvement of those resources." (iii) requires a "statement of any existing measures or facilities to be continued or maintained and any measures or facilities proposed by the applicant for the mitigation of impacts on fish, wildlife, and botanical resources, or for the protection or improvement of such resources, including an explanation of why the applicant has rejected any measures or facilities recommended by an agency described under (f)(3)(ii) of this section." LCFRB's reliance on this requirement is misplaced. First, these regulations only require explanation of why the applicant has rejected any measures recommended by an agency, but Tribes are not mentioned (they are explicitly mentioned in other parts of the regulations, though, so statutory construction mandates a reading that Tribes were intentionally ommitted). Second, the Services did not provide any recommendations on reintroduction when they issued their preliminary determinations in April 2019 that the Utilities have since "rejected." Rather, NMFS never provided recommendations on reintroduction contrary to the proposed application; rather, NMFS stated "The new information provided by the Licensee revealed uncertainty on both the likelihood of success and potential benefits of reintroduction and fish passage into the Yale Reservoir, as well as the likelihood that an in-lieu fund and resulting habitat restoration would provide comparable population level benefits as reintroduction and passage." NMFS Letter, April 11, 2019, p. 5.
Lower Columbia Fish Recovery Board	11	If the evaluations above conclude Recovery Plan goals cannot be achieved under the "Services decision within the established recovery period," then NMFS must "identify alternative approaches for achieving recovery plan expectations."	The Utilities maintain that the Merwin In Lieu approach will provide greater gain towards the Lewis River Settlement Agreement Reintroduction Goal and Recovery Plan goals then would be achieved with fish passage into Merwin Reservoir. NMFS will consider the In Lieu's approach and contribution to the Recovery Plan goals and determine if action is appropriate.
Lower Columbia Fish Recovery Board	12	Alternatives should include shifting threat reduction and productivity improvement efforts to other all-H impact categories in the Recovery Plan (hatcheries, harvest, habitat, etc.). For example, harvest reductions for spring Chinook are a potential alternative because freshwater habitat opportunities for this species are very limited.	Utilities maintain that implementation of proposed actions do not require offsetting actions in other impact categories. Proposed actions provide a greater benefit to Lewis River salmon and steelhead population than the alternative of providing fish passage into Merwin Reservoir. Given the level of effort of proposed actions, the Utilities encourage the LCFRB to continue their good work in promoting recovery advances in the catagories of hatcheries, harvest, hydro and habitat.
Lower Columbia Fish Recovery Board	13	If the evaluations above conclude population or strata goals cannot be met using current population-scale threat reduction efforts (esp. for spring Chinook), NMFS must identify changes to the ESU-scale scenario that will fully achieve VSP goals, which may place greater recovery burden on other Oregon or Washington-based populations.	See response to LCFRB comment 11.
Lower Columbia Fish Recovery Board	14	The "Services' decision" undermines the Recovery Plan's principle of "equitable sharing of recovery burden."	The original 2004 WA Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan, page A-5, states that "to ensure equivalent sharing of the recovery and mitigation burden, impacts in each area of effect (habitat, hydropower, etc.) should be reduced in proportion to their significance to species of interest." The LCSRFW Subbasin Plan does not elaborate on this, so it is conclusory to state that the Services' decision on the in-lieu restoration and deferral on fish passage for Yale undermines this principle.
Lower Columbia Fish Recovery Board	15	Achieving recovery goals is more certain by reintroducing fish into existing, productive habitat, rather than trying to improve occupied habitat that is already of moderate to high quality.	The purpose of the proposed actions is to not achieve recovery goals but to promote achievement of the Lewis River Settlement Agreement Reintroduction Outcome Goal: "to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations". Improving habitat upstream of Swift Dam will have a greater benefit towards the Outcome Goal than fish passage into Merwin Reservoir.
Lower Columbia Fish Recovery Board	16	More information is needed in the Strategic Plan to describe the relationship between short-term habitat actions the Utilities would take pursuant to the Services' in-lieu determinations and long-term habitat management commitments (driven by USFS) that will ensure anticipated benefits of habitat restoration efforts are fully realized	Utilities recognize need and value of long term committments on the part of both Utilities and USFS and have added appropriate language to Strategic Plan.
Lower Columbia Fish Recovery Board	17	The Utilities should keep the organizational structure for developing and implementing a Habitat Restoration Plan "as simple as possible" by contracting out key tasks (such as developing the HRP), relying on volunteers from the ACC to serve on the proposed Technical Advisory Committee, "and overall administration by the Utilities."	Utilities agree and have revised the Stategic Plan to reflect the approach suggested by the LCFRB (see response to LCFRB comment #19).
Lower Columbia Fish Recovery Board	18	The Utilities should take the "most streamlined approach possible" to implement the HRP in order to maximize benefits to the species. Steps such as ranking and selecting projects (Strageic Plan, Sections 1.2.2 and 2.6) and establishing annual priorities consistent with the HRP (Section 1.2.3) are unnecessary for implementing strategic mitigation actions.	Utilities agree and have revised the Stategic Plan to reflect the approach suggested by the LCFRB (see response to LCFRB comment #19).
Lower Columbia Fish Recovery Board	19	The Utilities could follow an alternative 6-step process for streamlining the HRP development and implementation: (1) Hire a contractor to develop HRP based on evaluation of watershed conditions and biological limiting factors conducted to date, using the ACC for technical guidance and feedback; (2) Develop phased construction approach to implement HRP, but minimize number of phases; (3) Complete the contracting process (RFP's, ACC evaluation, contractor selection); (4) Adjust project scope as needed; (5) Apply for permits and authorizations to implement HRP and initiate ESA, MSFCMA, and NHPA consultations as necessary; (6) Award construction contracts and monitor implementation	As noted above (LCFRB #18), the revised Strategic Plan now reflects the streamlined approach suggested by the LCFRB. Implementation to include the following 3 Steps: (1) Hire a contractor to develop the HRP based on evaluation of watershed conditions and biological limiting factors conducted to date, using the ACC for technical support/review; restoration planning will involve field confirmation of sites/flow data collection for hydraulic modeling, development of projects to conceptual plans; Habitat Restoration Plan includes a phased construction approach to implement, minimizing the number of phases; (2) Carry concept plans to 30% preliminary design including hydraulic modeling if needed, ACC review/evaluation, submit permits, 3) Use design build process to move 30% plans to final design, obtain final permits; construct project and monitor implementation.

Lower Columbia Fish Recovery Board	20	The Strategic Plan fails to state whether USFS will allow the Utilities access to federal lands for the Utilities to implement mitigation efforts. Will they?	See response to USFS comment #9
Lower Columbia Fish Recovery Board	21	The Strategic Plan fails to state whether USFS will provide large woody material for restoration projects or whether the material must be sourced from non-federal entities. Where will Utilities source LWM?	Large woody material may be available from a number of resources including material recovered from PacifiCorp's reservoirs, private timber purchases, etc.
Lower Columbia Fish Recovery Board	22	The Strategic Plan fails to state what USFS's long-term management plans are for portions of basin targeted for restoration. What are they?	See response to USFS comment #9
Lower Columbia Fish Recovery Board	23	The Strategic Plan fails to state whether USFS's long-term management plans are consistent with restoration of watershed processes. Are they?	See response to USFS comment #9
Lower Columbia Fish Recovery Board	24	The Strategic Plan fails to state whether habitat investments will be supported or undermined by future degradation of watershed processes. Which will it be?	Habitat investment is expected to offset the of impact of future degradation. Restoration will provide increased resiliency, and help ameliorate impacts of climate change, land management activities, or other factors acting to undermine watershed processes. Section 2.2 of the Strategic Plan has been revised to note potential for future watershed degradation and how restoration projects can lessen the impact to species of interest.
Lower Columbia Fish Recovery Board	25	Because habitat restoration projects and decisions on passage into and out of Yale Reservoir do not align, the timeline in the Monitoring Plan does not provide enough time to implement and evaluate population responses within the timeframe for in-lieu decisions as to Yale. (Example provided in LCFRB Comment Letter: This timeline provides 4-11 years of monitoring. Validation monitoring can require between 3-5 years of baseline/pre-project implementation monitoring followed by 10+ years of post-project implementation monitoring of targeted fish populations (see Table 5 in the Monitoring Plan). If implementation occurs as Utilities propose, the fastest validation monitoring results could be available 2 years *after* the time needed to make passage decisions for Yale).	The pre-project monitoring of smolts is based on data from the Swift FSC, which has been ongoing since 2013. Because of issues with efficiency and juvenile releases not all of these data are suitable pre-project data, but the data from 2015 and years following are suitable. Assuming the first on the ground restoration measures do not occur until 2022, there will be more than 5 years of pre-project data. Moreover, the Utilities should be able to collect at least 3 years of genetic data prior to the first restoration. Thus, while detecting a population level response will be challenging in a short time frame, we will have adequate pre-project data. The number of years of post-treatment monitoring (and pre-treatment monitoring) also depends upon the level of significance and effect size. Table 5 in the Monitoring Plan provides an approximate average of post-treatment monitoring. Smolts per spawner estimates provided in Table 8 suggest that 2 to 8 years of post-treatment monitoring are needed using a simple t-test. Thus, pre-project data suggest that for some species it will be possible to detect a response to In Lieu restoration in the time frame of the Monitoring Plan.
Lower Columbia Fish Recovery Board	26	As the Utilities recognize regarding their statistical power analysis, more time is likely needed to detect a population-scale response to habitat restoration efforts because multiple variables could influence that response. (Example: inter-annual variability in fish responses is likely greater for natural origin fish relative to hatchery origin fish).	Comment noted. Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by time.
Lower Columbia Fish Recovery Board	27	The Monitoring Plan fails to provide a "clear plan" for understanding control or reference conditions - i.e., although the Utilities state they do not believe watersheds outside the Upper North Fork of the Lewis River Basin are "similar enough" to use as a control watershed and that using subwatersheds within the Upper North Fork of the Lewis River Basin may no be feasible, the Monitoring Plan is "unrealistic" to implement and "expect the results requested by the Services."	The Monitoring Plan identified why watersheds outside the Lewis River basin cannot serve as a true "control", though may provide a good reference for broader-scale changes in fish abundance due to climate change or other regional factors. The Plan also explains why a within watershed control is not appropriate. To clarify appropriate reference watershed, text has been added explaining criteria.
Lower Columbia Fish Recovery Board	28	The Services' determinations and their relying upon monitoring for in-lieu determinations at Yale do not align with the underlying purpose of the in-lieu funds, which is to achieve benefits to anadromous fish populations "equivalent to or greater than benefits that would have occurred" had full anadromous passage through Yale and Merwin occurred. Using reach- or population-level responses to habitat restoration efforts of predominately hatchery origin fish as opposed to natural origin fish is "fundamentally flawed."	As the LCFRB is well aware, natural origin salmon and steelhead are few in numbers, however with the reintroduction of fish passage upstream of Swift Dam and implementation of the Lewis River Fish Passage Program, the populations of natural fish are increasing. Utilities acknowledge that monitoring the response of natural origin fish to the habitat restoration efforts is best, however monitoring the response of hatchery origin fish is not flawed in the sense that behavioral response to the habitat restoration will be significantly different. A hatchery origin adult is not expected to spawn in a boulder area with no gravel if an engineered spawning area is nearby. Additionally given both natural and hatchery origin adults are transported upstream of Swift Dam, both will be included in the monitoring efforts.
Lower Columbia Fish Recovery Board	29	"Overall the report does an excellent job at describing the strengths and weakness of a variety of monitoring approaches, and describes a recommended hybrid approach intend to measure population-scale response to the in-lieu program."	Comment Noted.
Lower Columbia Fish Recovery Board	30	The hybrid approach of (1) measuring successful natural origin breeders and smolts per breeder as well as (2) comparing pre- and post-habitat capacity by EDT modeling will not meet the test of statistically determining whether population-scale responses have occurred in accordance with Services' requirements.	The multi-pronged approach laid out in the Monitoring Plan is designed to determine whether statistically significant increases in smolts, and smolts to adults (breeders) have occurred at a reach and population level. Should this not be possible due to increased variability or delays in implementation or physical and biological response to restoration, the EDT and other models provide a way of estimating population level response.
Trout Unlimited/ American Rivers	1	Given the current state of dispute discussions, it is premature for PacifiCorp to proceed with the DLA at this time. Additionally, it is contrary to the Services' direction.	See response to NMFS comment #6
Trout Unlimited/ American Rivers	2	In its April 11, 2019 letter, NMFS explained that its preliminary determination would be finalized through "revisions to the [Settlement] Agreement and project license." Further, they state that NMFS would revise fishway prescriptions "[o]nce the Licensees have obtained necessary consent from the Agreement parties." This has not occurred at this time. Accordingly, it is inappropriate for the Licensees to move forward with the DLA.	See response to NMFS comment #6
Trout Unlimited/ American Rivers	3	Generally, the amendment applications are substantively and technically incomplete, as they fail to include any of the comments directed to the Licensees and the Services by disputing parties through the dispute resolution process.	See response to WDFW comment #8
Trout Unlimited/ American Rivers	4	Non-capacity amendments require consultation with resources agencies and Tribes to understand their concerns with the proposed amendment, identify "reasonable protection, mitigation, or enhancement measures to respond to impacts identified as being caused by the proposed amendment" and otherwise respond to recommendations/conditions submitted by the consulted parties. 18 C.F.R. section 4.38 (a)(7).	See response to WDFW comment #8 and response to Cowlitz Indian Tribe comment #12

Trout Unlimited/ American Rivers	5	Correspondence on such matters must be attached to the DLA. Id. There is a substantial number of dissenting documents in the record from agencies, Tribes and other disputing parties (including TU and AR) that have been submitted to the Licensees in the ACC and dispute resolution process that are not referenced in the DLA. These documents contain relevant information related to the concerns, supporting information and recommended measures from these parties. Without inclusion of these documents, the DLA is incomplete.	See response to WDFW comment #8
Trout Unlimited/ American Rivers	6	The In-Lieu Program Strategic Plan is premised on the idea that significant habitat restoration can provide the same level of benefit to key aquatic species as the fish passage provisions in the Settlement. However, many of the assumptions and analyses underlying this plan call into question whether the benefits to species will actually accrue at the scale and within the timeframe needed to provide the required level of benefit. Additional information is needed to assure that benefits to fish will accrue in a timely manner and will be sustainable over the long-term.	As noted, the Habitat Restoration Plan is premised on the expectation that significant habitat restoration can provide the same or greater benefit to transport species as providing fish passage into Merwin. This is founded on EDT modeling and is supported by data in Appendix D of the New Information Report, which identify EDT model estimates of the increase in fish production predicted for habitat improvement projects above Swift and below Merwin. In the latter, Cramer and Associates used estimates of Lewis River habitat type and quantity, fish densities, and measured change in fish production for habitat projects constructed throughout the region to estimate coho and steelhead juvenile and adult production resulting from habitat actions, e.g., placement of large woody debris (LWD), construction of engineered log jams (ELJ) and side channels. The total cost of all projects was estimated at $20 million. EDT estimates of adult abundance above Swift (with restoration) substantially exceeded production in Merwin (with fish passage). The Habitat Restoration Plan is an implementation plan. Underlying assessments of expected efficacy and evaluation of passage alternatives, including Alternative 3 (existing operations) and Alternative 2 (full passage) are described in the July 2017 Decision Support Document.
Trout Unlimited/ American Rivers	7	Additionally, to support informed decision-making and transparency, a more thorough analysis regarding the benefits that will accrue if the Settlement, including full fish passage, is implemented is warranted.	Previous EDT work informed the consideration of full fish passage, partial fish passage/partial in lieu funding, and full in lieu funding. Full in lieu funding as opposed to full fish passage is predicted to have the greatest value to fish production. The Services in their April 2019 letters provide a preliminary decision of Merwin In Lieu Fund and delay of decision on fish passage into Yale Reservoir. Per this, the Utilities have prepared plans and exhibits demonstrating the value of the preliminary decisions over other alternatives.
Trout Unlimited/ American Rivers	8	Much of the high-priority habitat targeted for rehabilitation and restoration occurs on United States Forest Service (USFS) lands. It is unclear whether USFS is willing to allow modifications to their lands for this purpose, or that the activities can be accomplished within USFS permitting guidelines.	See response to USFS comment #9
Trout Unlimited/ American Rivers	9	Additionally, it is not clear that the long-term management objectives of USFS are structured to ensure that the benefits from habitat restoration will be fully realized.	See response to USFS comment #9
Trout Unlimited/ American Rivers	10	There also seems to be an assumption that USFS will be a significant source of logs for restoration activities. There is no formal indication that USFS has agreed to this. These considerations are all items that should be addressed in the application.	Large woody material may be available from a number of resources including material recovered from PacifiCorp's reservoirs, private timber purchases, etc.
Trout Unlimited/ American Rivers	11	In their 4/11/2019 letter NMFS proposes: "1) To remove [Settlement] Sections 4.6 and 4.7 in-lieu of habitat restoration funding, and 2) To defer a decision on Section 4.5 and 4.8 until 2031 and 4.8 to 2035 (respectively). This would ensure that in-lieu habitat restoration funding used in lieu of fish passage facilities in Lake Merwin perform as proposed, within set timelines." This timeframe is unrealistic to evaluate the success of in-lieu measures.	Implementation of the Monitoring Plan will provide information that will assist the Services in making a Yale fish passage decision. The level of population information will be constrained by time.
Trout Unlimited/ American Rivers	12	The letter calls for before and after (BACI) monitoring which requires years for permitting; pre-treatment surveys; habitat manipulation installation; multiple generations of fish utilization; and post-restoration surveys. It will take years to collect enough data to make an evaluation. An adequate BACI analysis (7 -11 years) cannot be conducted during the proposed timeframe. It will take years to install habitat improvements, years for fish to respond, and years to collect enough data to make an evalutaion. Accordingly, the proposed timeframe is unrealistic.	The pre-project monitoring of smolts is based on data from the Swift FSC, which has been ongoing since 2013. Because of issues with efficiency and juvenile releases not all of these data are suitable pre-project data, but the data from 2015 and years following are suitable. Assuming the first on the ground restoration measures do not occur until 2022, there will be more than 5 years of pre-project data. Moreover, the Utilities should be able to collect at least 3 years of genetic data prior to the first restoration. Thus, while detecting a population level response will be challenging in a short time frame, we will have adequate pre-project data. The number of years of post-treatment monitoring (and pre-treatment monitoring) also depends upon the level of significance and effect size. Table 5 in the Monitoring Plan provides an approximate average of post-treatment monitoring. Smolts per spawner estimates provided in Table 8 suggest that 2 to 8 years of post-treatment monitoring are needed using a simple t-test. Thus, pre-project data suggest that for some species it will be possible to detect a response to In Lieu restoration in the time frame of the Monitoring Plan. As far as length of time to implement restoration, a streamlined process is described in the Strategic Plan to ensure restoration is completed in a timely fashion.
Trout Unlimited/ American Rivers	13	We do not agree with eliminating passage and delay of implementation until 2031. This will disrupt the established Lower Columbia Fish Recovery Board recovery process.	The purpose of the proposed actions is to not achieve recovery goals but to achieve the Lewis River Settlement Agreement Reintroduction Outcome Goal: "to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations". Improving habitat upstream of Swift Dam will have a greater benefit towards the Outcome Goal than fish passage into Merwin Reservoir.
Trout Unlimited/ American Rivers	14	There is an independent timeline in the lower Columbia for endangered species recovery. The Lewis Basin is a major component of the overall recovery plan for Spring Chinook. Delays in restoration in the Lewis Basin pose overall threats to restoration in the entire lower Columbia ecosystem.	The purpose of the proposed actions is to not achieve recovery goals but to promote achievement of the Lewis River Settlement Agreement Reintroduction Outcome Goal: "to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations". Improving habitat upstream of Swift Dam will have a greater benefit towards the Outcome Goal than fish passage into Merwin Reservoir. Actions also provide major support towards the goals of the Recovery Plan.
Trout Unlimited/ American Rivers	15	[A]ccurate monitoring and scientific evaluation of the success of any in-lieu habitat work within the Lewis watershed cannot be completed in the proposed timeframe. We anticipate that any approved project would require a full scientific design with a treatment and a statistically verified response.	Reach level response of physical habitat and juvenile fish abundance can be done within the project time frame, though monitoring for additional years would be beneficial. See previous responses about length of time needed to detect a populations level response.
Trout Unlimited/ American Rivers	16	PacifiCorp has been very reluctant to do any monitoring on "Aquatic Fund" projects in the past and has specifically banned others which does not lend confidence to their assertions that adequate monitoring would be achieved for the in-lieu projects.	Given the time frame, the Utilities have developed the most tractable approach for detecting population level response. Text has been added to clarify that Utilities will compare population level response and EDT model outputs before and after restoration to determine if the increase in adults predicted by the original EDT model have been achieved.

Trout Unlimited/ American Rivers	17	Generally, the Application errs on the side of over-estimating the benefits of habitat restoration while under-estimating the benefits of full fish passage. This is mostly due to over-reliance and inappropriate use of the EDT analysis.	All assumptions regarding the effectiveness of upstream and downstream passage facilities are based on performance metrics established in the Lewis River Settlement Agreement and were consented to by the EDT model subgroup to the ACC. EDT modeling was used during the FERC relicensing process to estimate the outcome of fish passage at each dam. An outcome of the modeling during relicensing was support for construction of trap and haul fish passage at Merwin and Swift dams. The full passage alternative was modeled during the New Information process. This scenario was called Alternative 2. The alternative produced the fewest spring Chinook, coho and steelhead of the five alternatives modeled. Results can be found in Table 1 of "Review of Lewis River Hydroelectric Project Fish Passage Alternatives and Recommendation of Utilities". PacifiCorp and Cowlitz PUD 2018.
Trout Unlimited/ American Rivers	18	For transparency and comparison purposes, the application must more fully assess the benefits of the full passage alternative including the long-term benefits of reintroducing salmon and steelhead throughout their contiguous native range in the Lewis River basin. This alternative is given only a cursory look.	See response to TU/AR comment #6.
Trout Unlimited/ American Rivers	19	Additionally, it should provide additional information supporting conclusions that its restoration sites are appropriate.	Per the revised Strategic Plan, habitat project site selection to be vetted through the ACC.
Trout Unlimited/ American Rivers	20	The Services' 4/11/2019 preliminary determiantion letter states: "NMFS' justification relies on fish abundance estimates produced by a revised PacifiCorp and NMFS Ecosystem Diagnostic Treatment analysis. Although the use of EDT for abundance estimates and management decisions is cautioned against (McElhany et al. (2010); Roni et al. (2018)), this modeling is currently the best avaialble information for comparison between the benefits of reintroduction/ fish passage in lieu habitat restoration options for increasing salmon abundance. The revised EDT analysis offers adult fish abundance estimates under both scenarios, as well as the abiltiy to adjust for estimated juvenile losses during outmigration due to collection effiency of a fish collection/ passage facility at Table 1." It clearly indicates using EDT analysis is cautioned against for abundance estimates, yet the Services used exactly that for their analysis. It is a mathematical model based on questionable inputs. We do not believe it is the best available data and disagree with its premise.	All assumptions regarding the effectiveness of upstream and downstream passage facilities are based on performance metrics established in the Settlement Agreement. Habitat assumptions are based on field data collection efforts conducted by the USGS, USFS, experienced contractors, and PacifiCorp. These inputs will be updated as field crews begin identifying locations for habitat enhancement actions. The EDT model is used extensively throughout the Pacific Northwest for conducting habitat analyses. The Lower Columbia Recovery Plan is built to a significant extent on EDT modeling. The Columbia River HSRG used EDT estimates of productivity, capacity and abundance to model hatchery effects to ESA-listed species (Hatcheryreform.us).
Trout Unlimited/ American Rivers	21	While in-lieu restoration may lead to increases in fish abundance in Merwin, this is not the case in Yale Reservoir. We question the accuracy and methodology of the EDT technique. Full passage provides superior benefits for fish in Yale. Restoration provides limited benefit for fish in Yale, while reintroduction more than doubles the coho and steelhead abundance. Chinook production is also increased in Yale versus restoration.	The Merwin In Lieu Fund is directed to fund habitat improvements upstream of Swift Dam; it will not lead to increase in fish abundance in Merwin. See response to TU/AR comment #17.
Trout Unlimited/ American Rivers	22	We do not believe that the four tributaries (Clearwater, Clear, Drift Creeks and the N. F. Lewis) identified for restoration efforts should be deemed appropriate solely on the basis of high EDT scores. These basins have negative temperature, chemical and access issues that should also be considered.	Habitat ratings, including stream temperature, for each of these streams were based on field habitat surveys conducted by the USGS, USFS and other parties. If stream temperature is an issue, then habitat actions designed to reduce stream temperature would be implemented if appropriate.
Trout Unlimited/ American Rivers	23	In addition, other streams (Little Ck., etc.) that have superior temperature regimes, should be considered more thoroughly yet are ignored in the DLA. Moreover, potential negative effects of salmon restoration on other native species (bull trout, whitefish, other native trout etc.) within those reaches have not been adequately considered. This is particularly critical for listed bull trout.	As described in the June 2016 New Information Report (p. 588) several factors were used to designate priority reaches, to screen out lower priority reaches, and identify potential restoration actions within high priority reaches. These included EDT outputs, habitat and life stage from a limiting factors analysis, watershed assessment data from previous analysis on riparian, sediment, and hydrologic condition, and geomorphic channel characteristics and channel type. The Services April 2019 Letter recommended that restoration be directed to reaches above Swift. Potential impacts to other other species, including bull trout; will be evaluated per ESA consultation with the US Fish and Wildlife Service.
Trout Unlimited/ American Rivers	24	TU and AR do not agree that the Licensees engaged in a collaborative effort with the Settlement Agreement parties to evaluate “new information” to determine whether the fish passage provisions in the Settlement Agreement were appropriate.	Predicted fish abundance and overall efficacy of habitat actions support the Merwin In Lieu program over fish passage into Merwin Reservoir. See response to TU/AR comment #17.
Trout Unlimited/ American Rivers	25	The Application does not remedy the fact that neither the Services nor the Licensees have provided sufficient information supporting a finding that fish passage is inappropriate.	See response to Cowlitz Indian Tribe comment #16
Trout Unlimited/ American Rivers	26	It is clear that the Licensees are (and have not been) interested in evaluating all new information; focusing instead on information that they generated. Criticisms of their information has received minimal consideration. To that point, regarding criteria 1 (above), new technologies have come on board which show promise in upstream fish passage. They were not reviewed.	TU/AR have identified the WHOOSHH fish passage system for consideration. Please see response to TU/AR comment #27.

Trout Unlimited/ American Rivers	27	The WHOOSHH (fish cannon) system is proving itself at mainstem Columbia River dams. Fish are passed through a flexible hose pipe pneumatically. The manufacturer (WHOOSHH) claims to be 80% less expensive than conventional fish ladders. These innovative methods were not referenced at all within the New Information analysis. Their use should be explored. No other means of collection or other sites were referenced.	Whoosh Innovations has developed two systems; one for sorting and one for transport.The transport system is a flexible tube that uses a pneumatic differential pressure across the fish to safely transport the fish quickly up an over obstacles such as dams. These devices require other facilities to pump and direct water into the reservoir or river to attract fish into the sorting device. An entrance gate that provides a jet of water and a false weir to attract fish up further into the dewatered sorter. The transport tubes are appropriately sized to the girth of the fish. Given the broad size range of bull trout that are anticipated, at least two or perhaps three transport tubes would need to be deployed in order to pass all sizes of bull trout residing in the system.The protocols for bull trout passage include not only physical measurements and detection of PIT tags but also genetic sampling and tagging captured fish. Physical handling during genetic sampling and tagging events defeats the advantage of fast automated sorting provided by Whoosh technology. Given the low number of fish expected to be migrating upstream and therefore captured at upstream collection sites, and the need to handle fish for genetic sampling and tagging, the Whoosh system did not offer significant benefits and was not incorporated into the proposed bull trout passage facilities for the Lewis River.
Trout Unlimited/ American Rivers	28	[S]ince spring 2019, there has been a vast improvement in downstream collection at Swift dam due to reducing the depth (increasing the floor height) of the collection channel. Collection efficiencies of all fish species have increased dramatically. This is not reflected in the New Information analysis. Swift operations are showing increased efficiencies. The fact that Swift collections are improving serves to strengthen the argument that passage at Merwin and Yale is appropriate.	The Utilities appreciate the acknowledgement of noted improvement in downstream fish collection at Swift dam. Additional information has been added to Exhibit E which considers EDT fish production with varying collection efficiencies. Results demonstrate that even with different collection efficiencies, the Merwin in lieu alternative produces more fish than fish passage into Merwin reservoir. Habitat associated with Merwin reservoir is limited for coho and wintersteelhead and nonexistent for spring Chinook spawning.
Trout Unlimited/ American Rivers	29	[W]ith the proper design and effort fish can be collected efficiently, as seen in existing dams (see Table 3.4-1 below; Baker, North Fork, River Mill). The Swift Dam collection has the lowest efficiency of all seven dams (11.8%), even though it was designed based on the Baker River gulper. Baker collections average 92% for coho and 87% for sockeye. In 2019 and 2020, the Swift downstream collector has shown a dramatic increase in collection efficiency not reflected in the Licensees' or Services' analysis.	To help understand the impact of varying juvenile collection efficiencies at the Swift Floating Surface Collector, EDT model runs have been completed for CEs of 30%, 55%, 75% and 95%. Please see Exhibit E section 4.1.1.1 for model results.
Trout Unlimited/ American Rivers	30	Collection at Swift can and should be improved. Collection at Yale or Merwin should not be dismissed merely because of poor past collection efficiencies at Swift, which are now steadily improving.	PacifiCorp continues to take steps to improve the collection efficiency at the Swift Floating Surface Collector. Facility improvements are scheduled to be completed over the next few years. Fish passage into Merwin is dissmissed not because of fish collection efficiency, but because of lack of associated habitat. Yale fish passage is delayed to determine if completing habitat restoration measures provides equal or greater benefit than the outcome that might be realized with fish passage into Yale Reservoir.
Trout Unlimited/ American Rivers	31	Instead of meaningfully considering all available information, the Licensees and Services rely on an analysis that presumably supports the premise that habitat restoration can provide the same benefits to aquatic species as fish passage.	As Section 1.3 of the New Information Report explains, in 2011 PacifiCorp gave notice to the ACC that it would be taking steps to collect new information that would inform the Services' determination if additional fish passage facilities were warranted. Just because there was a prompt for the evaluation, does not mean there was any premise upon which the subsequent analysis flowed. TU/AR also fails to cite what information was not considered together with everything else presented to the Service in the New Information Report as part of PacifiCorp's study.
Trout Unlimited/ American Rivers	32	[T]he habitat restoration analysis has faulty assumptions. It assumes: restoration benefits accrue instantly (not true); that historic conditions can be replicated (not true - especially in the lower basin); that a 300 year old growth forest can be replaced immediately; that template conditions can be achieved for only $500,000/mile (not true for the lower portion of the basin) and that restoration can substitute for providing initial fish access.	Predicted fish abundance and overall efficacy of habitat actions support the Merwin In Lieu program over fish passage into Merwin Reservoir. See response to TU/AR comment #17.
Trout Unlimited/ American Rivers	33	[T]he benefits of reintroduction through fish passage would be immediately realized as the USGS found that Lake Merwin tributary habitats would support the spawning and juvenile rearing of coho salmon (Al-Chokhachy 2018; NMFS 4/11/2019 letter).	Spawning habitat for coho salmon and steelhead is available with fish passage into Merwin reservoir, however the length of that habitat is limited to 9.5km. Current EDT modeling predicts habitat associated with Merwin Reservoir would produce from 118 to 445 Coho, 16 to 65 steelhead and 0 spring Chinook adults, respectively.
Trout Unlimited/ American Rivers	34	The benefits of fish passage have been dismissed however due to a course "costs" assessment. Importantly, "costs" are not specified as a consideration in the New Information criteria outlined in the Settlement.	The defined term "New Information" in § 4.1.9 of the Settlement Agreement outlines baseline requirements for the minimum standard of materials that may be submitted to the Services for consideration. "New Information is defined as ***information relevant to anadromous fish reintroduction and fish passage*** , including that presented by any Party, and provided to the Services and the Licensees." Settlement Agreement at § 4.1.9(c) (emphasis added). Cost analysis is a relevant factor to be considered.
Trout Unlimited/ American Rivers	35	[Cost] is a non-issue and is not referenced within the New Information criteria. It does not belong in the Services' letters. Cost should not be considered in evaluating whether it is warranted to deviate from the terms of an agreed-upon settlement agreement against the interests of many of its signatories.	See response to TU/AR comment #34
Trout Unlimited/ American Rivers	36	There has been little discussion or effort directed toward trout or other native non-game species. Bull trout, because they are listed as "threatened" on the Endangered Species List, merit a full discussion. Rainbow, and cutthroat trout are not mentioned, nor are kokanee, whitefish, suckers, dace, sculpin or stickleback. Anadromous reintroduction will have positive or negative effects on all these species. Only Spring Chinook, coho and winter steelhead have been evaluated under the in-lieu new information. Information and analysis regarding other species' needs must be evaluated and included in the Application.	Comment noted. Impacts to Coho, spring Chinook, winter steelhead and bull trout are the focus of the analysis because impacts to those species drive the Services' decisions regarding fish passage under the Settlement Agreement and are the emphasis of the Lower Columbia River Recovery Plan. Impacts to other fish species are, however, evaluated generally in Section E.4.1.1 of Exhibit E.

Trout Unlimited/ American Rivers	37	If the existing in-lieu recommendation is accepted by FERC, TU and AR recommend a complete amendment/revision of the Lewis River license and Section 18 of the Federal Power Plan. We support the USFWS position regarding delay on Yale by canvassing the entire ACC for their approval. Currently, all parties other than the Licensees are in favor of full passage. ... Additionally, we support a robust adaptive management program with defined triggers for alternative actions (including reinstatement of fish passage) if habitat restoration does not work.	Comment noted. The Services have made a preliminary determination that fish passage is inappropriate. The Services will continue to follow procedure outlined in the NMFS 4/11/2019 letter. The Draft Application notes revisions to existing § 18 fishway prescriptions per the described procedure. Approval by ACC is not required under the settlement agreement or the Services letters. Necessary consent, referenced by the NMFS letter is derived from § 4.1.9 of the Settlement Agreement, which stipulates, "If any New Information and comments are submitted to the Services... the Licensees shall convene a meeting of the ACC for the purpose of discussing the New Information and comments... If the Services have concluded that one or more of the passage facilities should not be constructed... the Services shall advise the ACC in writing of such conclusion." FERC has been notified of the Services preliminary determinations.
Trout Unlimited/ American Rivers	38	We also believe population level monitoring is necessary to determine if fish populations have in fact achieved the predicted EDT responses [in addition to NMFS monitoring minimum requirements].	Given the time frame, the Monitoring Plan developed the most tractable approach for detecting population level response. Text has been added to the Monitoring Plan to clarify that Utilities will compare population level response and EDT model outputs before and after restoration to determine if the increase in adults predicted by the original EDT model have been achieved.
Trout Unlimited/ American Rivers	39	We are concerned about the ability to provide both sufficient treatment and control sites within the sub-watersheds in the basin. This is required to prove the treatment has worked and has in fact caused an increase in fish abundance beyond that associated with fish passage.	This is a potential problem, but control reaches will be identified in the conceptual and preliminary design phase of the Restoration Plan to ensure there are adequate control reaches set aside to monitor the response. Text has been added to the Monitoring Plan to clarify this.
Trout Unlimited/ American Rivers	40	We are surprised that NOAA Fisheries in the Services letter did not use the standard monitoring techniques, which they specifically call for evaluating within the Columbia basin. Previously, NMFS has directed that the analysis should also include evaluation of reduced and deferred gains in Viable Salmonid Population (VSP) parameters (abundance, productivity, spatial distribution, and diversity). These must evaluate gain or loss from delaying both reintroduction and in-lieu actions.	Evaluation of VSP parameters is included in the recommended population monitoring approach discussed in Section 1.3.2.6 of the In-Lieu Monitoring Plan.
Trout Unlimited/ American Rivers	41	Given the importance of Lewis River populations to the broader Lower Columbia recovery scenario, the focus should include evaluation of impacts at the population, strata and Evolutionarily Significant Unit (ESU) scales. This should include an analysis regarding the impact of Lewis River species on other populations in the larger basin.	The directed purpose of the Lewis River fish passage program and proposed in lieu funding is achieve the Lewis River Settlement Agreement Reintroduction Outcome Goal; the Utilities are not required to complete Hydro actions identified in the Recovery Plan. Implementation of actions towards the Reintroduction Outcome goal will support the Recovery Plan.
Trout Unlimited/ American Rivers	42	The monitoring plan proposes snorkel surveys in late summer and winter/spring. A series of snorkels will be necessary (testing for observer efficiency) over the whole year as fish move and migrate at different times. This is particularly the case for Spring Chinook in the Lewis, as they migrate throughout the year.	Text has been added to Monitoring Plan to describe snorkel procedures to minimize observer bias and to provide confidence intervals around abundance estimates in a reach for snorkeling. Reach level abundance estimates are snapshots in time and the Monitoring Plan proposes to do them in two key seasons when little juvenile fish movement occurs (summer and winter low flow).
Trout Unlimited/ American Rivers	43	There is also questions over the testing methodology, as the Licensees' plan calls for using t-tests. Such tests may be adequate to determine a change in relative abundance, but will not document achieved abundance goals.	T-tests are simple, straightforward, and robust. However, the Monitoring Plan proposes to use additional analysis methods to examine response to restoration (GLM) as well as non-parametric tests should assumptions for t-test not be met. The Plan also indicates that EDT model results before and after restoration will be used to determine whether adult abundance goals have been met.
Trout Unlimited/ American Rivers	44	[W]e question the prioritization of streams that contain three salmon species; this does not necessarily make them the best choice for restoration. The prioritization process fails to consider negative effects on listed bull trout or other native fish species, as salmon-oriented restoration projects are evaluated. Improving habitat for coho and Chinook juveniles may place native trout, especially listed bull trout, under increased predation and competition - violating the ESA. This must be adequately evaluated in the Application.	The prioritization of stream reaches developed in consideration of the April 2019 letter from NOAA Fisheries and EDT model outputs to identify the highest priority reaches throughout the upper Lewis River basin that would produce the largest increase in spring Chinook, coho and steelhead. In developing the Habitat Restoration Plan, the Utilities will consider potential impacts on bull trout. Please see section 2.6 Project Ranking of the Strategic Plan.
Trout Unlimited/ American Rivers	45	Nonvalid conclusions particularly regarding predation level were advanced by the Licensees that are contradicted by the data. Mark Sorel was the primary investigator for the New Information. He was subcontracted by PacifiCorp through the USGS. His data was presented in his master's thesis and in two Trans. Am. Fish. Soc. research articles. These documents were committee certified and peer reviewed. He stated, ". . . Merwin Reservoir would function as a migration corridor without imposing undue predation mortality, . . . Our findings suggest that predation should not preclude the feasibility of reintroducing anadromous salmonids." There is no specific data or any relevant referenced citations within the New Information stating anadromous fish passage is inappropriate	The Utilities position is supported by the 2018 USGS document "Development of New Information to Inform Fish Passage Decisions at the Yale and Merwin Hydro Projects on the Lewis River, Washington - Final Report, 2018". The document on page 125 states "We found large northern pikeminnow represent a substantial predation threat to anadromous smolts in Lake Merwin". While this statement is informative, additionally important are the results of the EDT modeling which assumed that overall downstream survival rates (75% to 80%) would be achieved regardless of predation rates in the reservoirs. Modeling results identify that implementation of the Merwin In Lieu alternative is very favorable over fish passage into Merwin Reservoir. If the EDT Merwin Reservoir mortality assumption were modified per the USGS findings or historical results from Hamilton et al., 1970, one could expect lower Merwin fish production levels.
Trout Unlimited/ American Rivers	46	Initially, Sorel's work was not provided to the ACC. Subsequently, a second report was developed by the USGS, specifically for PacifiCorp. It had no peer review and was provided to the ACC and Services. But, discrepancies within this report and previously known information from the Seral et al. documents caused the USGS to issue a second version of their report attempting to clarify and removing contentious assertions made in the initial draft document. The credibility of the conclusions in the final released document are questionable.	During the USGS study process, the agency provided presentations to the ACC and prepared draft documents for ACC review. On April 26, 2016, PacifiCorp distributed to the ACC for a 30-day review and comment period, a draft of the document entitled "New Information Regarding Fish Transport into Lake Merwin and Yale Lake." The document was a collection of study reports prepared by the U.S. Geological Survey and the various environmental consultants. Only the Lower Columbia Fish Recovery Board responded providing comments on this information.
Trout Unlimited/ American Rivers	47	As an example, the final draft states, "There is a high predation potential for all seasons, but particularly during summer/ spring." The actual Sorel stomach analysis data shows no kokanee present in Spring and comprise only 14% of pikeminnow diet during summer.	See response to TU/AR comment #45.
Trout Unlimited/ American Rivers	48	[T]he Licensees presented work from Mason, Bruce & Girard, Inc. stating: "[b]ased on an analysis of stomach contents of different age classes, salmonids are a primary prey fish for Lake Merwin Northern Pikeminnows with fork lengths (FL) greater than or equal to 300mm (11.8 inches)." The initial Sorel et al data indicated pikeminnow $\leq$ 300 mm eat more crayfish, other smaller pikeminnow, and sculpin than salmonids. During Fall at peak predation levels, kokanee only constitute 28% of large pikeminnow diet. The USGS and Mason Bruce and Girard used the data collected by Sorel et al., and put their own interpretation on it to highlight the Licensees' perspective. Their interpretations are at odds with the original data.	Sorel et al data is limited to current conditions where juvenile salmonids are not at the densities expected with fish passage into Merwin Reservoir. Given availability of additional prey throughout the year, the diet of pikeminnow, especially the large adults, could be different than observed.

Trout Unlimited/ American Rivers	49	There were also some absurd assumptions made in the final New Information analysis: Pikeminnow would shift all diet choices to migrating smolts; smolts would be present year-round in Merwin; and 0 age spring Chinook would be the primary prey target for pikeminnow. Sorel's original predation levels were amplified over 40 times, with no explanation. And finally, there was no discussion of management actions to reduce predation (seining, fish traps etc.), as if predation reduction is impossible. It is manageable with concerted effort.	As identified in the 2018 USGS report, northern pikeminnow represent a substantial predation threat in Merwin Reservoir. The value of predator control is questionable given such was previously attempted in Merwin Reservoir and found to not be worth the effort.
Trout Unlimited/ American Rivers	50	These discrepancies cannot be explained, unless data was deliberately chosen to complement preexisting incorrect suppositions to bolster the case of for no passage. In reality, predation is a modest, anticipated and manageable element of the reintroduction plan outlined in the Settlement. Predation can be mitigated and overcome, if desired. Predation within Swift Reservoir was not addressed in the management plan.	Utilities disagree that northern pikeminnow predation would be "modest" given the 2018 USGS report identified northern pikeminnow represent a substantial predation threat in Merwin Reservoir. Predation in Swift Reservoir was not addressed as previous studies have not identified a large northern pikeminnow population in that reservoir.
Trout Unlimited/ American Rivers	51	ACC approval of restoration and monitoring plans is necessary; and based on the previous New Information analysis provided by the Licensees monitoring must be thoroughly vetted.	See reponse to WDFW comment #7
Trout Unlimited/ American Rivers	52	Aside from the Licensees and the Services, there is little support for the current situation. ... The current in-lieu plan is only supported by the Licensees, who have a definite financial interest in the path forward. Local representatives of the Services have been unable to defend the in-lieu decision. This has not been a fair and impartial process.	See response to WDFW comment #8
Trout Unlimited/ American Rivers	53	If targets and goals for any affected species cannot be achieved under the Services decision within the established recovery period, then we believe it is incumbent upon NMFS to identify different approaches for achieving recovery plan expectations. These should include shifting threat reduction and productivity improvement efforts to other impact categories in the overall lower Columbia Recovery Plan, including implementation of existing fish passage obligations in the Settlement Agreement.	The Utilities maintain that the Merwin In Lieu approach will provide greater gain towards the Lewis River Settlement Agreement Reintroduction Goal and Recovery Plan goals then would be achieved with fish passage into Merwin Reservoir.
Trout Unlimited/ American Rivers	54	Bull trout have been largely ignored and relegated to a minor role in Yale fish passage. The Bull Trout Passage Plan does not do enough to reverse this.	The Utilities maintain they have followed the language and intent of the Lewis River Settlement Agreement with concern to bull trout passage. Furthermore, the Utilities believe the language and intent of the Settlement Agreement was always to put more emphasis on salmon/steelhead anadromous fish passage, than on bull trout passage, hence the language within SA Section 4.10 which states the Yale downstream collection facility facility shall be similar in magnitude and scale as a modular floating Merwin-type collector and is not intended to be a passage facility of the same magnitude and expense as the Swift Floating Surface Collector.
Trout Unlimited/ American Rivers	55	The scaled-down plan does not provide equivalent benefits to anadromous, adfluvial, and fluvial life history strategies historically displayed by bull trout populations throughout their range, and specifically within the Lewis Basin. Historical and anecdotal evidence exists for fluvial or anadromous bull trout presence, below Merwin Dam and in the vicinity of Woodland.	The Utilities maintain that in accordance with the Lewis River Settlement Agreement, the proposed fish passage facilities and operations plan equally benefit any and all life-history traits that a migratory bull trout may exhibit by providing upstream passage at Merwin, Yale and Swift dams, and downstream passage at Swift and Yale dams.
Trout Unlimited/ American Rivers	56	In the Coastal Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus) September 2015, prepared by U.S. Fish and Wildlife Service Washington Fish and Wildlife Office Lacey, … The Recovery Plan calls for full passage. It did not recommend in-lieu measures.	Parties to the Lewis River Settlement Agreement including Trout Unlimited and American River as signatories provided for an anadromous fish passage in lieu alternative. Please see section 4.1.9 of the Settlement Agreement. Section 4.10 of the Settlement Agreement provides for bull trout fish passage in the absence of anadromous fish facilities.
Trout Unlimited/ American Rivers	57	the Settlement states, "Unless otherwise directed by USFWS, bull trout collected in the Swift Downstream Facility shall be transported to Yale Lake, except that bull trout with a smolt-like appearance, as determined by PacifiCorp (using methods devised in Consultation with the ACC), shall be transported to a location determined by USFWS below Merwin Dam." This does not seem to be the case at present.	PacifiCorp continues to implement the Lewis River downstream Transport Plan - Interim Final (December 2009) which was provided to the ACC for 30-day review on November 13, 2009; the Services specifically approved the plan on December 21, 2009.
Trout Unlimited/ American Rivers	58	Settlement, Section 4.10 requires bull trout passage in the absence of anadromous fish facilities. … PacifiCorp currently has not met the Yale completion date.	The timeline for implementation has been delayed given the Services did not make their preliminary decision determinations until April 2019. PacifiCorp expects to complete design and then implement construction upon issuance of final orders from the Federal Energy Regulatory Commission directing construction of bull trout fish passage measures. See Exhibit C of the license amendment application for project schedule.
Trout Unlimited/ American Rivers	59	USFWS also points out "Determine Need for Merwin Downstream Bull Trout Passage Facility" is required by 2025. "This decision would be based on a determination that bull trout have increased sufficiently in number in Lake Merwin to warrant construction of this facility in the Merwin forebay." It is unclear where will these fish come from if no passage is provided.	Comment noted. Given no bull trout spawning habitat is associated with Merwin Reservoir, and per the Settlement Agreement, fish barrier nets have been installed to prevent entrainment of fish through the Yale powerhouse or over the Yale dam spillways, access for bull trout into Merwin reservoir is limited to collection and transport of fish from the Yale downstream bull trout collection system.
Trout Unlimited/ American Rivers	60	We believe the Settlement requires the best and most efficient collector possible within the Yale forebay. In conjunction with the USFWS and the Lewis River bull trout recovery team (LRBTRT); TU, as an ACC member, anticipated being included in the design and planning of the actual collector and offered the opportunity to provide input into its operation. This has not been the case.	The conceptual design for the Yale downstream bull trout collector was first shared with members of the ACC and LRBTRT in August of 2019. The conceptual design for the system is consistent with section 4.10 of the Settlement Agreement. That same design was provided in the draft applications for FERC license amendments that were provided to the ACC and parties to the Settlement Agreement for 90-day review. To date no party has identified a different conceptual design that is similar to that identified in section 4.10 of the Settlement Agreement.
Trout Unlimited/ American Rivers	61	PacifiCorp consultants presented their initial designs to the ACC on 8/8/19. There was no opportunity to propose any ideas, only an opportunity to comment on R2 consultant's proposed plans. We anticipate little more than a bare bones Merwin type floating trap as proposed by USFWS and PacifiCorp. We are still awaiting this collaboration. To date, it has not occurred. Specifically, the lack of attraction flow proposed for use in the Yale forebay trap virtually assures that bull trout seeking a downstream pathway will be denied. If the chosen Merwin type plan is used; some measure to provide attraction flow (pumps, etc.) will be required for success.	The Utilities have put forth a proposal and solicited comments. The Lewis River Bull Trout Recovery Team meetings in February and March of 2020 included the proposed bull trout passage facilities design and collection procedures as part of the meeting agenda and discussion between members ensued. The LRBTRT submitted comments on the Bull Trout Fish Passage Plan, and these comments were incorporated. Concerning the proposed downstream collection facility, the Utilities maintain the proposed Yale downstream collector design follows the intent of the Lewis River Settlement Agreement Section 4.10, which states the facility shall be similar in magnitude and scale as a modular floating Merwin-type collector and is not intended to be a passage facility of the same magnitude and expense as the Swift Floating Surface Collector. The Utilities will adaptively manage the proposed downstream bull trout facilities, in consultation with the USFWS, ACC and the LRBTRT, to capture bull trout as safely and effectively as possible under the proposed design.
Trout Unlimited/ American Rivers	62	USFWS has yet to describe or defend why they recommended a Merwin like fish collector in the Yale forebay. They have tied themselves to an outdated ineffective passage design without any justification for said design. This is in spite of their 2015 Recovery Plan citing that lack of continuity in the basin is a major limiting factor for bull trout within the Lewis Basin.	Parties to the Lewis River Settlement Agreement including Trout Unlimited and American River as signatories provided for a modular floating Merwin-type collector to be installed in the Yale forebay in the absence of anadromous fish facilities. Please see section 4.10 of the Settlement Agreement.

Trout Unlimited/ American Rivers	63	Currently USFWS is failing to re-establish continuity between reservoirs in the Lewis basin, and the proposed amendments will not do so either. If USFWS is unable to complete their role in safeguarding bull trout perseverance due to shortages in staff, funds or time, they should acknowledge this and leave the process or turn it over to WDFW as the bull trout management agency.	The Utilities expect that the USFWS will, through ESA section 7 consultation, complete a thorough analysis and identify measures to be completed consistent with the Lewis River Settlement Agreement and their agency's Federal Power Act Section 18 authority.
Trout Unlimited/ American Rivers	64	If pursuant to Section 4.1.9 (1), PacifiCorp does not build the Yale Upstream Facility, and (2) USFWS determines on or before the 17th anniversary of the Issuance of the New License for the Yale Project that collect-and-haul methods established under Section 4.9.1 or 4.9.2 are not meeting bull trout performance standards provided in Section 4.1.4, then on or before the 17th anniversary of the Issuance of the New License for the Yale Project PacifiCorp shall complete construction of and provide for the operation of alternate passage facilities (the "Yale Upstream Bull Trout Facility"). It is unlikely the Licensees will meet this timeline.	The timeline for implementation has been delayed given the Services did not make their preliminary decision determinations until April 2019. PacifiCorp expects to complete design and then implement construction upon issuance of final orders from the Federal Energy Regulatory Commission directing construction of bull trout fish passage measures. See Exhibit C of the license amendment application for project schedule.
Trout Unlimited/ American Rivers	65	Only full fish passage will allow coho and other salmonid smolts to exit Yale Reservoir and avoid competing with bull trout for food and spawning access.	Anadromous fish passage into Yale Reservoir is not proposed. Fish barriers are upstream of the Swift No. 1 Powerhouse intake and Swift Dam spillway to prevent downstream passage of anadromous fish into Yale Reservoir. At times during high flow events and specific to dam safety, the barrier net may be dropped to pass high river flow. Frequency of such events is rare and does not happen on an annual basis.
Trout Unlimited/ American Rivers	66	Also, Cougar Creek, the only bull trout spawning stream in the Yale system, must be protected from spawning salmon and steelhead. A 100% tight fish trap is necessary to protect bull trout spawning areas by removing salmon and steelhead adults.	The Utilities agree with the importance of Cougar Creek to bull trout. As proposed, anadroumous fish passage into Yale reservoir would not be considered by the Services until 2031.
Trout Unlimited/ American Rivers	67	The Licensees should exhibit the same concern for bull trout in Swift Reservoir as they appear to in Yale.	On an annual basis, the Utilities meet or exceed all bull trout monitoring and evaluation obligations with concern to the Swift Reservoir bull trout population. All annual monitoring and evaluation of this population is performed in collaboration with the LRBTRT, and in consultation with the USFWS.
Trout Unlimited/ American Rivers	68	PacifiCorp committed to studying interactions between bull trout and reintroduced salmonids, but this has been minimal. Requested diet studies have not occurred. Stomach analysis of adult steelhead or chinook coho and steelhead parr also have not occurred. More is necessary.	All bull trout monitoring and evaluation in the Lewis River basin is performed in collaboration with the Lewis River Bull Trout Recovery Team, which is comprised of individuals representing the United States Fish and Wildlife Service, Washington Department of Fish and Wildlife, United States Geological Service, United States Forest Service, Lower Columbia Fish Recovery Board, and Trout Unlimited. The Utilities and LRBTRT annually adaptively manage, in consultation with the USFWS, all of the Utilities extensive bull trout monitoring and evaluation obligations. Each annual monitoring plan is approved by the USFWS.
Trout Unlimited/ American Rivers	69	Finally, the Settlement Agreement section 4.2 contains the following requirement: 4.2.1 "Monitor and adaptively manage interactions between bull trout and reintroduced salmonids. Reintroduction of anadromous salmonids into the upper Lewis basin will result in interactions between bull trout and reintroduced salmonids that may have positive or negative outcomes. At this time, reintroduction success and results of the aforementioned interactions are unknown. Adaptively manage the reintroduction strategy to benefit all species." This monitoring is not occurring. From 2016-2018, bull trout were not tagged examined or measured. No abundance estimates were generated and salmon – bull trout interactions (stomach analysis) did not occur. License amendments should not be enacted until these provisions of the Bull Trout Recovery Plan are included and formalized in the Licensees' Plan.	All bull trout monitoring and evaluation in the Lewis River basin is performed in collaboration with the Lewis River Bull Trout Recovery Team, which is comprised of individuals representing the United States Fish and Wildlife Service, Washington Department of Fish and Wildlife, United States Geological Service, United States Forest Service, Lower Columbia Fish Recovery Board, and Trout Unlimited. The Utilities and LRBTRT annually adaptively manage, in consultation with the USFWS, all of the Utilities extensive bull trout monitoring and evaluation obligations. Each annual monitoring plan is approved by the USFWS.
Trout Unlimited/ American Rivers	70	The in-lieu decision is inconsistent with the Settlement Agreement, not based on the best available information, made without considering ACC input and appears to have been a political decision designed to permit the Licensees to avoid providing fish passage at the two lower Lewis River dams.	The Utilities disagree with Trout Unlimited's and American Rivers' conclusory statements regarding the Services' preliminary determination. Specifically, the Utilities believe the in-lieu decision is consistent with the Settlement Agreement and that the New Information which formed the basis of the decision represents the best available science. ACC input was considered in accord with Section 4.1.9 of the Settlement Agreement. Details of this consultation is now included as an Appendix to Exhibit E of the applications.
Trout Unlimited/ American Rivers	71	Neither the Services nor the Licensees have been able to adequately explain or defend the decision to forego fish passage obligations in favor of an in-lieu alternative. As noted above, the ACC was not involved in developing the in-lieu alternative, yet the Licensees want the ACC to reengage to help push this unsupported license amendment process forward in a very short timeline. Frankly, there is not enough time to do an adequate job. The whole process has been carefully crafted to support a narrative that this represents a unified stakeholder outcome. It does not.	The Utilities disagree with Trout Unlimited's and American Rivers' conclusory statements regarding the Services' preliminary determination. Specifically, the Utilities believe the in-lieu decision is consistent with the Settlement Agreement and that the New Information which formed the basis of the decision represents the best available science. ACC input was considered in accord with Section 4.1.9 of the Settlement Agreement. Details of this consulation is now included as an Appendix to Exhibit E of the applications.

Date: April 8, 2020

To: Lewis River Aquatics Coordination Committee, ACC

From: Lewis River Bull Trout Recovery Team, LRBTRT

Subject: Technical Review of the Lewis River Bull Trout Passage Plan

This document provides a technical review of the Lewis River Bull Trout Passage Plan by the Lewis River Bull Trout Recovery Team (LRBTRT).

The LRBTRT is concerned that this plan falls short of providing complete connectivity from the headwaters to the Columbia River. Ideally a bull trout passage plan would provide complete connectivity from the headwaters to the Columbia River via a passive, volitional passage system. This ideal system would provide bull trout the opportunity to express the full suite of migratory strategies (e.g., anadromous, fluvial, adfluvial) without human intervention (e.g. stress-induced physical transport).

Given that passive, volitional passage (e.g., fish ladders) is not an option for the Lewis River projects due engineering constraints (the height of the projects limit available options) and monetary constraints posed in Section 4.10 of the Settlement agreement, we do not have major concerns with the preferred alternatives PacifiCorp has put forth for the upstream passage solutions (the collection facilities in the Yale Tailrace and the Swift Bypass Reach). However, the downstream solutions need further consideration.

The plan does not provide for realistic collection of subadult/adult bull trout that are attempting to move downstream through the projects. Neither the Swift Floating Surface Collector nor the proposed Merwin-style trap for the Yale forebay are designed to collect adult fish. Further, there is a lot of uncertainty whether a Merwin-style trap will collect any fish, large or small, without attraction flow.

Regardless of the type of passage facilities put in place, the LRBTRT strongly recommends that the facilities should be monitored/evaluated for effectiveness via scientifically defensible methods as stated in Section 4.10 and Section 9 of the Settlement Agreement. Connectivity is listed as a primary threat to the Lewis River Bull Trout population (USFWS 2015). Evaluating the effectiveness of the facilities will allow us to understand how well we are managing the connectivity threat, and how well we are progressing towards delisting goals.

The LRBTRT strongly suggests that sampling protocols (sections V and VI of the Passage Plan), including when sampling occurs (e.g., May – October) and decisions on how and where to transport fish be an adaptively managed process between PacifiCorp and the LRBTRT. To that end, we suggest including a statement in the sampling protocol section of the plan that states, "PacifiCorp will continuously work with the Lewis River Bull Trout Recovery to adaptively manage passage decisions and protocols."

References:

USFWS (US Fish and Wildlife Service). 2015. Coastal recovery unit implementation plan for bull trout (*Salvelinus confluentus*). USFWS, Portland, OR.

Lower Columbia Fish Recovery Board
11018 NE 51st Circle
Vancouver, WA 98682
(360) 425-1555

May 11, 2020

Kimberly McCune
PacifiCorp
825 NE Multnomah, Suite 1800
Portland, Oregon 97232

Subject: Application for Non-capacity License Amendments for Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects; FERC Nos. P-935, P-2071, P-2111, P-2213

Dear Ms. McCune:

Attached please find the Lower Columbia Fish Recovery Board's (LCFRB) comments on the above-referenced non-capacity license amendment proposals. We appreciate the opportunity to provide these comments.

Sincerely,

Steve Manlow
Executive Director
Lower Columbia Fish Recovery Board

Attachment: Exhibit A – LCFRB comments on draft license amendments

cc: LCFRB Members
Kimberly Bose, FERC
Chris Oliver, NOAA
Jennifer Quan, NOAA
Robyn Thorson, USFWS
Erik Neatherlin, GSRO
Kaleen Cottingham, RCO
Lewis River ACC Members

Exhibit A
Lower Columbia Fish Recovery Board Comments on
Application for License Amendment, Hydroelectric Project FERC
Nos. P-935, P-2071, P-2111, and P-2213

The Lower Columbia Fish Recovery Board (LCFRB) has reviewed the draft applications for non-capacity amendment of the Federal Energy Regulatory Commission (FERC) licenses for the above-referenced Merwin, Yale, and Swift Hydroelectric Projects, and the attached In Lieu Program Strategic Plan and Monitoring Plan. The following comments outline recommendations for finalizing the draft applications. They should not be construed as endorsement of the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) (Services) preliminary determinations regarding fish passage under Section 4.1.9 of the Settlement Agreement (Agreement). The concerns raised in our June 10, 2019 dispute letter, while acknowledged, have not been materially addressed by the Services, PacifiCorp or Public Utilities District No. 1 of Cowlitz County (Utilities). We remain concerned that the proposed amendments, if granted, would be inconsistent with the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan (Recovery Plan), as well as the Agreement.

The LCFRB submits the following comments as an Aquatics Coordination Committee (ACC) member, signatory to the Agreement, and as a state regional recovery organization established by Washington State statute, specifically Chapter 77.85 RCW. As such, we have standing as an agency for purposes of consultation under 18 CFR. The following comments are based upon a review of the application materials for the Yale Hydro-electric Project FERC Project No. P-2071. However, given the duplication in documents submitted for review, these comments apply to all of the above referenced applications.

FERC Submittal Requirements and Content of Environmental Review

The February 5, 2020 request for comments indicates that the Utilities are requesting consultation and comments on the draft application non-capacity license amendments pursuant to 18 CFR § 4.38 (a)(7). We have reviewed the consultation requirements under the referenced CFR and have concluded that the application is incomplete. Specifically, 18 CFR § 4.38 (a)(7) specifies the following:

> "…The amendment as filed with the Commission must summarize the consultation with the resource agencies and Indian tribes on measures to respond to impacts identified as being caused by the proposed amendment and response to any objections, recommendations, or conditions submitted by the agencies or Indian tribes. Copies of all written correspondence between the application, the agencies, and tribes must be attached to the application."

As stated in the consultation request, the proposed amendments are in direct response to the Services' preliminary determinations made under Section 18 of the Federal Power Act. This determination relates to Section 4.1.9 of the Agreement. This section provides the opportunity for submission of new information to be considered by the Services in determining whether fish passage requirements have become “inappropriate”, and allows for consideration of an in-lieu fund as an alternative to providing fish passage. The Service’s determination provides the basis for, and is inextricably tied to, the Utilities’ proposed license amendment request.

The agencies and Tribes consulted on the draft license amendment provided discrete recommendations through their role on the ACC on the various alternatives relating to the in-lieu decision. In all cases, the resource agencies and Tribes provided detailed biological and policy rationale for their recommendations. All parties with the exception of the Utilities recommended alternatives that include provisions for fish passage into Yale and/or Merwin reservoirs, and thus objected to the full in-lieu decision of the Utilities, as well as the preliminary decision by the Services. Furthermore, six of the Agreement signatories, including the LCFRB, filed disputes on the Services determination pursuant to Section 15.10 and 16.6 of the Agreement. The concerns and points of dispute outlined in the LCFRB’s June 10, 2019 letter were incorporated by reference in the dispute letter submitted by the Washington Department of Fish and Wildlife (WDFW) on July 8, 2019.

The disputes filed by the Agreement parties outlined a variety of discrete impacts and objections with the proposed in-lieu decision and implementation approach. This information is not included or addressed in the draft FERC license amendment documents submitted for review. While there is a reference to including comment letters following the comment period (Environmental Report, Section E.2.0), that statement appears to be within the context of comments that may be received in the future on the license amendment materials currently submitted for review. The recommendations and comments submitted previously through the ACC in-lieu discussions and subsequent dispute processes are foundational to supporting an objective evaluation of the license amendment requests. The failure to attach these documents to the amendment request is contrary to the spirit and intent of the above FERC application submittal requirements, and undermines the potential for thorough and comprehensive review by interested parties, including the public. It also appears contrary to the requirement under 18 CFR 4.51 (f)(3) to append letters from each resource agency and Tribe consulted on the amendment.

In light of the above, we believe that the license amendment request is substantively and technically incomplete without the relevant feedback and comments provided by agencies and ACC members to date. The Utilities should formally withdraw the request and revise it with the following information:

- Copies of all feedback, comments and recommendations relating to the in-lieu evaluation and decision-making process (letters, emails and meeting notes) received from resource agencies and Tribes, including from both the ACC and subsequent dispute processes. This should also include any and all correspondence from the Services regarding to their preliminary determination and dispute processes; and,
- A detailed response from the Utilities to objections, concerns and recommendations provided by the disputing parties to date.

Once the draft application is amended, it should be resubmitted for review, with a new comment period.

Exhibit E, Environmental Report

The focus of the Exhibit E Environmental Report is limited largely to discussion of impacts associated with implementation of the Merwin In-Lieu Strategic Plan, the Lewis River Basin Implementation Monitoring Plan, and the Bull Trout Passage Plan. However, as described in Section E.1.1, the scope of the proposed action also includes the Services decision to delay a determination regarding the appropriateness of constructing fish passage facilities into and out of the Yale Reservoir until 2031 and 2035. For purposes of evaluating environmental impacts, the baseline condition against which to evaluate impacts should include either providing for fish passage into Yale Reservoir or providing alternative in-lieu habitat improvements, within the timeframes established in Sections 4 and 7 of the Agreement. As described in our June 10, 2019 dispute letter, the Services decision to delay a determination on fish passage into Yale Reservoir will have a material adverse environmental impact to biological recovery of ESA-listed salmon and steelhead.

The treatment of biological impacts resulting from the decision delay is limited to a short paragraph in Section E.4.1.1.2 that simply acknowledges delay in both fish passage and habitat improvement projects. No further evaluation of potential biological impacts, including temporal losses of function, is provided. We recommend that the Environmental Report be revised to include a thorough analysis of impacts to ESA-listed fish species from the decision delay. This should include evaluation of reduced and deferred gains in Viable Salmonid Population (VSP) parameters (abundance, productivity, spatial distribution, and diversity) resulting from delaying both reintroduction and in-lieu actions. Given the importance of Lewis River populations to the broader Lower Columbia recovery scenario, the focus should include evaluation of impacts at the population, strata and Evolutionarily Significant Unit (ESU) scales in relation to the overall and individual recovery action implementation schedule established in the Recovery Plan. Consistent with the requirements of 18 CFR 4.51 (f), this section should also include a description of any measures to mitigate impacts, including temporal losses of function, on ESA-listed fish, as well as an explanation as to why the Utilities have rejected the recommendations provided by resource agencies and Tribes consulted on this matter to date regarding reintroduction.

If the above-referenced evaluation concludes that population-scale Recovery Plan goals and threat reduction targets and goals for any affected species cannot be achieved under the Services decision within the established recovery period, then we believe it is incumbent upon NMFS to identify alternative approaches for achieving recovery plan expectations. This should include shifting threat reduction and productivity improvement efforts to other all-H impact categories in the Recovery Plan (hatcheries, harvest, habitat, etc.). This could include harvest reductions for spring Chinook, as freshwater habitat opportunities for this species are very limited. If the environmental evaluation concludes the population or broader strata goals and targets cannot be achieved as currently structured with shifts in population-scale threat reduction efforts, especially for spring Chinook, we believe it is incumbent upon NMFS to identify modifications to the ESU-scale scenario that will fully achieve VSP goals. This may place greater recovery burden on other Oregon and/or Washington populations. It is also important to note, from a social perspective, that the Services decision undermines the Recovery Plan principle of “equitable sharing of recovery burden”. This principle was foundational in garnering partner support for achieving environmental threat reductions and improvements across all-H impacts, and must be carried forward into the recovery implementation phase if we expect to maintain support into the future.

Draft Lewis River Merwin In-Lieu Program Strategic Plan

As described above, the LCFRB is currently disputing the Services decision regarding fish passage into Yale and Merwin reservoirs. In light of this, the following comments should not be construed as supporting the overall in-lieu approach and implementation of the Strategic Plan. Rather, they should be viewed as recommendations to maximize benefits should the Services decision ultimately prevail.

Consistent with the Recovery Plan priorities, we believe that a higher level of certainty in achieving recovery goals can be achieved by reintroducing fish into existing, productive habitat, rather than trying to improve occupied habitat that is already of moderate to high quality. Furthermore, the ability of the Upper Lewis River watershed to support healthy and harvestable populations of ESA listed salmon and steelhead over the long-term will largely be driven by how the United States Forest Service (USFS) manages the landscape. Short-term habitat actions as proposed in the Strategic Plan can be an important bridge toward achieving habitat productivity improvements, but only if coupled with long-term land management that restores and sustains watershed processes. To provide the proper context for the proposed Strategic Plan, additional information is needed on the relationship between the proposed habitat restoration work and long-term management commitments that will ensure anticipated benefits are fully realized.

The Strategic Plan describes a new organizational structure to oversee development and implementation of a Habitat Restoration Plan (HRP). This includes establishing a variety of entities, including a Program Administrator (PA), Technical Advisory Committee (TAC) and a new subgroup of the ACC. We encourage the Utilities to keep the organizational structure as simple as possible. Consideration should be given to contracting out key tasks such as developing the HRP, relying upon volunteers from the ACC to serve on the TAC, and overall administration by the Utilities.

The proposed implementation approach includes tasks such as ranking and selecting projects that best achieve outcomes and goals (Section 1.2.2; Section 2.6), establishing annual priorities consistent with the HRP (Section 1.2.3), and prioritizing projects for funding. Tasks such as these are critical steps in grant processes where multiple proposals from different entities must be prioritized for funding on an annual or biennial basis, within the context of Recovery Plan priorities. However, we do not believe these are necessary steps when it comes implementing strategic mitigation actions in an efficient and effective manner, especially in light of the Services timeframe for demonstrating a population scale fish response. We encourage the Utilities to develop a more streamlined approach that produces habitat and fish population benefits in the shortest timeframe possible, excluding the grant process elements identified above. This could include the following generalized steps:

- Hire a contractor to develop a single, comprehensive HRP based on the evaluation of watershed conditions and biological limiting factors conducted to date, using the ACC for technical guidance and feedback. The project should clearly demonstrate how identified elements quantitatively support the EDT-modeled benefits of restoration by NMFS in their preliminary determination. The project should also include a restoration timeline in order to assess feasibility of completing population-scale monitoring by the 2031 and 2035 deadlines. The scope of the project should be aligned with available funding, but provide for flexibility and scaling depending on bids;
- Develop a phased construction approach for implementation of the comprehensive HRP, based on logistical considerations, constraints, and funding availability (the number of phases should be minimized);
- Complete the contracting process (RFP's, ACC evaluation, contractor selection);
- Adjust the project scope as needed;
- Apply for permits and authorizations for implementation of the HRP in its entirety, and initiate the associated Endangered Species Act (ESA), Magnuson Stevens Fishery Consultation and Management Act, and National Historic Preservation Act consultations (depending on permit duration, some extensions or resubmittals may necessary; and,
- Award construction contracts and monitor implementation.

We recognize the above process is very simplified and there are additional supporting steps, but we encourage the Utilities to take the most streamlined approach possible to implement the HRP project in a timely manner, without unnecessary process. This will ensure benefits to fish are derived as soon as possible, and monitoring can be initiated with minimal delay. However, it should be noted that proposed projects may or may not qualify for expedited permit processing, so early consultation with regulatory agencies is advised as standard processing can delay permitting for years.

This document makes multiple references to "protection" in addition to restoration. While protecting existing functioning habitat is the highest general habitat priority in the Recovery Plan, we are uncertain what this term means in the context of the In-Lieu Program Strategic Plan as it is restoration focused. Much of the high priority habitat targeted for restoration in the in-lieu decision is under federal ownership, managed by the USFS. This raises several questions:

- Has the USFS concurred in writing that they will allow access to federal lands for the Utilities mitigation efforts? If not, this could be a fatal flaw for the program as a whole.
- Will the USFS provide large woody material for restoration projects, or would the material have to be sourced from non-federal entities?

- What are the USFS's long-term management plans for the portions of the basin targeted for restoration? Are long-term management plans consistent with restoration of watershed processes?
- Will habitat investments be supported or undermined by future degradation of watershed processes?

These are increasingly important considerations that the LCFRB and other recovery organizations are working to integrate into various habitat restoration and grant processes. These considerations were not addressed in the Services in-lieu determination, but should be further explored before moving forward with implementing the in-lieu decision.

Comments on Draft In-Lieu Monitoring Plan

The Services in-lieu decision identified discrete requirements that the monitoring plan must address. Specifically, it states the following:

> "Monitoring activities will be statistically based with sufficient power to determine the independent fish population benefits accrued from implementation of the in-lieu habitat program. Before/After Control/Impact (BACI) or similar statistical design for the before-after monitoring program must be used."

The timeline between habitat enhancement project implementation and decisions on providing passage through Yale and Swift are not in alignment. This timeline only provides between four and eleven years of post-project implementation monitoring. Validation monitoring, which is required to determine fish population benefits as requested by the Services, can require between three and five years of baseline, or pre-project implementation monitoring followed by ten or more years of post-project implementation monitoring of targeted fish populations (see Table 5 in the Monitoring Plan). If implementation occurs as proposed, the fastest validation monitoring results could be available is still two years longer than the timeline outlined by the Services for making passage decisions for Yale Reservoir. Even without considering external factors that can slow any validation monitoring study, such as extreme climate conditions and delays in implementing habitat projects, there appears to be insufficient time to both implement and evaluate population responses within the broader in-lieu decision-making timeframe.

Measuring population-scale responses to habitat enhancement depends in part on the number, distribution, and origin of spawners annually released above Swift Reservoir, as well as collection efficiency of downstream migrating smolts from Swift Reservoir. As the Monitoring Plan authors note, adults that are released into the upper NF Lewis are primarily hatchery origin fish, and thus may not represent fish that rely on newly enhanced habitat to complete their freshwater life stages. It could be difficult to parse out fish responses to habitat improvements versus fish responses to reintroduction program management changes when considering the additional variables of fish origin, limited understanding of how fully seeded the upper watershed is for all targeted species, and continual changes in collection efficiencies. This is especially a concern when trying to determine population-scale responses on a relatively short timescale: typically more time, or data, is necessary when more variables are potentially affecting results. This is illustrated in the caveats the authors include for their power analysis - more time is likely required to detect a population-scale response than indicated in the power analysis because inter-annual variability in fish responses is likely greater for natural origin fish than the historically stocked hatchery origin fish that the analysis is based on.

Identifying control watersheds limits feasibility of measuring population-scale responses to habitat enhancement. As the Monitoring Plan authors describe, population-scale validation monitoring designs rely on comparing treated watersheds (i.e. where habitat enhancement projects are implemented) to control watersheds (i.e. where no projects are implemented, but conditions are similar to treated watersheds, pre-habitat enhancement). The authors do not believe any watersheds outside the Lewis are similar enough in watershed conditions or fish management to be used as a control watershed. This leaves the alternative of comparing subwatersheds within the Lewis River to each other. The authors believe this alternative may not be feasible either though due to the likely need to have habitat enhancement efforts across multiple tributaries, and a lack of similar subwatersheds in the Upper NF Lewis. Without a clear plan for understanding control or reference conditions, it is unrealistic to implement the Monitoring Plan and expect the results requested by the Services.

One of the key challenges we see with the Services determination and reliance upon monitoring as a basis for a future on Yale Reservoir reintroduction is lack of alignment with the underlying purpose of the in lieu funds. In addition to our conclusions that the Services have not met the requirement of demonstrating fish passage is "inappropriate", under Section 7.6.3 of SA, in lieu funds are intended to be spent on:

> "…mitigation measures that collectively contribute to meeting the objective of achieving benefits to anadromous fish populations equivalent to or greater than benefits that would have occurred if passage through Yale and/or Merwin reservoirs had been provided."

Anadromous fish passage benefits must be viewed in light of the overall goals of the reintroduction program. Section 3.1 of the Agreement states that the "introduction outcome goal of the comprehensive aquatics program contained in Sections 4 through 9 of this Agreement is to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations ('Reintroduction Outcome Goal')."

Evaluating benefits of the proposed habitat work must occur within the context of the reintroduction program purpose. As described in the Monitoring Plan, the reintroduction program in the Lewis is not yet fully mature, and as noted above, fish transported into upper watershed are predominantly of hatchery origin. Using reach- or population-level responses of predominantly hatchery origin fish to restoration projects as a proxy for evaluating whether an equivalent level of benefits to "genetically viable, self-sustaining and naturally reproducing" populations of anadromous fish is fundamentally flawed, which brings into question the efficacy of the Services determination.

Overall the report does an excellent job at describing the strengths and weakness of a variety of monitoring approaches, and describes a recommended hybrid approach intend to measure population-scale response to the in-lieu program. Ultimately, it is key that the Monitoring Plan links habitat enhancement to changes in natural origin smolt abundance and smolts per adult, measuring successful natural origin breeders and smolts per breeder, and comparing pre- and post-habitat capacity using EDT modeling. While this hybrid approach will provide very useful information, we do not believe it will meet the test of statistically determining whether population-scale responses have occurred in accordance with the Services requirements.

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
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May 12, 2020

Mr. Mark A. Sturtevant
Managing Director, Renewable Resources
PacifiCorp – Hydro Resources
825 NE Multnomah Street, Suite 1500
Portland, OR 97232

Gary Huhta
General Manager
Cowlitz County Public Utility District No. 1
961 12th Avenue
Longview, WA 98632

RE: Draft Applications for Non-capacity Amendments of Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects; FERC Nos. P-935, P-2071, P-2111, P-2213

Dear Mr. Sturtevant and Mr. Huhta:

Washington Department of Fish and Wildlife (WDFW) appreciates this opportunity to comment on PacifiCorp's and the Cowlitz County Public Utility District's (hereinafter referred to together as the "Utilities'") *Draft Applications for Non-capacity Amendments of Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects; FERC Nos. P-935, P-2071, P-2111, and P-2213,* respectively. As a state fish and wildlife agency, WDFW provides its comments herein and attached hereto as a consulting party under 18 C.F.R. § 4.38 and a signatory to the November 30, 2004, Settlement Agreement Concerning the Relicensing of the Lewis River Hydroprojects, FERC Project Nos. 935, 2071, 2111, and 2213 (hereinafter "Settlement Agreement").

WDFW's comments contained herein and attached hereto include those generated from specifically reviewing the Environmental Report enclosed as Volume II (Exhibit E) to at least two of the draft applications, as well as Appendices to that Environmental Report that have been submitted with all four of the draft applications. Those Appendices consist of a January 2020 *In Lieu Program Strategic Plan* (Strategic Plan), *Lewis River Basin Implementation Monitoring Plan* (Monitoring Plan), and *Lewis River Bull Trout Passage Plan* (Bull Trout Passage Plan). These draft plans appear to be versions of those that the Utilities submitted to WDFW for review and comment on or around August 1, 2019. WDFW provided some general comments to those draft plans but declined to submit detailed comments due to the Alternative Dispute Resolution process that had been initiated under the Settlement Agreement and remained pending until March of 2020. WDFW trusts that the Utilities will append copies of WDFW's comment submitted on August 26, 2019, along with any amendment applications that they ultimately finalize and file with FERC.

Please be aware that the comments contained herein and attached hereto are technical in nature. They should not be interpreted as an agreement by WDFW to amend any of the project licenses or modify the Settlement Agreement. At this point, WDFW disagrees that the Utilities—or any other party to the Settlement Agreement—have presented "New Information" under Section 4 of the Settlement Agreement which would justify funding for habitat restoration in lieu of passage for anadromous fish required under Sections 4.6 and/or 4.7 thereto. Instead, in light of state law (RCW 77.57.030) requiring durable and efficient fishways at dams and other obstructions in Washington streams and a review of the best available science, adult and juvenile passage at Merwin and Yale Dams remains appropriate.

The anadromous salmonid reintroduction program above Merwin Dam was a centerpiece of the Settlement Agreement and was key to meeting the interests of the parties signatory thereto. Joint Explanatory Statement, p. 11. Fish passage was – and continues to be – an important component of that program, which was ultimately aimed at achieving genetically viable, self-sustaining, naturally reproducing, harvestable populations of anadromous species above Merwin Dam at greater than minimum viable populations.

The attached comments,[1] briefly summarized below, are provided in light of that overarching goal, to share WDFW's technical expertise and to help increase – through robust monitoring and adaptive management – the likelihood of success in meeting anadromous fish reintroduction outcome goals required under Section 3 of the Settlement Agreement should FERC grant the Utilities' non-capacity amendment applications as they are currently written.

Notwithstanding the technical comments provided herein and in the attached, WDFW remains concerned that important recovery opportunities are likely to be lost through eliminating fish passage through Merwin Reservoir and from delaying the decision to provide fish passage through Yale Reservoir. WDFW remains concerned that these decisions, if approved by FERC and incorporated into the project licenses, will have an significant adverse impact to anadromous species and will pose a high barrier to the Settlement Agreement parties being able to meet the overarching goal of the anadromous salmonid reintroduction program. WDFW hopes that the Utilities will work diligently with WDFW and the other Settlement Agreement parties to ensure that this concern is properly addressed.

Overall

- WDFW submits that Aquatics Coordinating Committee (ACC) approval of the Strategic and Monitoring plans currently attached to the Utilities' draft applications should occur before those plans are submitted to FERC. The draft applications are largely based upon letters issued by NOAA Fisheries and the U.S. Fish and Wildlife Service (together, the "Services") in April of 2019. In those letters, the Services indicate that they will need to rely upon ACC approval of all restoration and monitoring plans in order to determine efficacy of the In-Lieu Program being proposed by the Utilities. WDFW is concerned that, if FERC were to grant the Utilities' non-capacity amendment applications, such approval might also constitute approval of the Strategic and Monitoring Plans currently appended to the draft applications, and those plans as they are written would then be incorporated into the Utilities amended licenses. As a member of

[1] Previous comments from WDFW on processes leading up to this draft application are incorporated by reference.

the ACC, WDFW has not provided support for plan elements or approval of either the Strategic Plan or the Monitoring Plan, and it is unaware of support or approval granted by other ACC members. Thus, submitting any sort of In-Lieu restoration or monitoring plans, including those attached to the draft applications, would be premature at this point.

- For the above reasons, the Utilities should work collaboratively with the ACC to produce Strategic, Monitoring and Bull Trout Passage plans that the ACC as a whole can support.

- If the Utilities cannot obtain ACC approval of the plans prior to submitting their non-capacity amendment applications with FERC, then for the above reasons, the Utilities should not include such plans with their amendment applications.

- As alluded to above, on August 1, 2019, the Utilities provided the ACC preliminary draft plans for a 30-day review. WDFW provided some comments on August 29, 2019. WDFW requests that all correspondence be included in full as part of the ACC / TCC Comment Attachment for the plans. In addition, WDFW requests that the Utilities attach all ACC correspondence and written communication regarding development of the in lieu decision and plans be included as consultation materials submitted to FERC for the draft non-capacity license amendment applications.

Environmental Report

- E.4.1 Fish, Wildlife and Botanical Resources (18 CFR 4.51(f)(3)) in the Environmental Report discusses long- and short-term impacts for the proposed bull trout passage facilities and restoration actions under the Merwin In-Lieu Program. The proposal fails to fully describe the opportunities lost by eliminating fish passage through Merwin Reservoir and from delaying the decision to provide fish passage through Yale Reservoir.

- Although there is a thorough description of potential benefits of habitat restoration, impacts from abandoning and delaying fish passage are inadequately addressed.

- While fish passage at a high head dam requires active adaptive management to achieve its goals, delaying passage at Yale guarantees the total absence of salmon from Yale Reservoir and its tributaries. In addition, there is considerable uncertainty with respect to the ability of in lieu habitat restoration to achieve its stated objectives. The impact to fish, wildlife, and botanical resources from continued lack of passage through Merwin Reservoir has not been described.

Strategic Plan

- WDFW encourages the Utilities to develop a streamlined approach for quickly implementing habitat restoration actions as described in the Merwin In Lieu Program and the associated Strategic Plan and Habitat Restoration Plan (HRP). Eliminating unnecessary process will increase the probability of achieving benefits to fish and habitat in the shortest timeframe possible, and monitoring can be initiated with minimal delay.

- The Strategic Plan prioritizes projects that protect the highest quality habitat over restoring processes and habitats. This is contrary to the objectives outlined in the Services' letter and the Settlement Agreement. Protection of highest quality habitat is not likely to meet achieve anadromous fish population abundances equivalent to or greater than abundances that would have occurred with passage through Yale and/or Merwin reservoirs.

Monitoring Plan

- WDFW reviewed the proposed Monitoring Plan to determine whether the proposed plan will sufficiently evaluate and confirm the adult salmon and steelhead response PacifiCorp has outlined as an expectation due to habitat restoration and as is referenced in the Services' letter. Detailed comments on the monitoring plan are included in Attachment A.
- WDFW recognizes the challenges inherent in developing a robust, high quality monitoring program. However, as currently written, the proposed monitoring approaches are inadequate.
- WDFW summarizes an alternative approach; this approach was originally proposed in WDFW's September 2018 letter to the Services. The approach uses empirical data from spawners, outmigrants, survival of out migrants, and juvenile fish collection efficiency to validate the spawner-smolt relationship predicted by the Ecosystem Diagnosis and Treatment (EDT) model. WDFW has used this method to evaluate observed fish population performance compared to predicted EDT performance in the Lower Columbia Salmon and Steelhead Recovery Plan.
- Regardless of approval to proceed with an in-lieu approach, WDFW recommends immediate improvement of the current adult and juvenile monitoring above Swift to meet NOAA monitoring guidance, including unbiased estimates of abundance and survival with acceptable levels of precision. The proposed improvements in fish monitoring are needed to allow for the successful evaluation of the fish population level response to restoration.

Bull Trout Passage Plan

- WDFW is concerned that the proposed Bull Trout Passage Plan does not provide complete connectivity from the upper Lewis Basin to the Columbia River. Connectivity is listed as a primary threat to the Lewis River Bull Trout population in the U.S. Fish and Wildlife Service's (USFWS) Coastal Recovery Unit Implementation Plan for bull trout (USFWS 2015). WDFW is concerned that deferral of a decision by the USFWS on whether to require construction of the Merwin Reservoir Downstream Bull Trout Passage Facility will result in a lack of connectivity ultimately threatening recovery of the Lewis River Bull Trout population.
- WDFW is generally supportive of the preferred alternatives that PacifiCorp has described for upstream bull trout passage solutions; however, WDFW has several concerns regarding plans for downstream collection and passage, and the monitoring required for adaptive management of these actions. These concerns are outlined in Attachment A.

WDFW looks forward to continuing to work with PacifiCorp and Cowlitz PUD on implementation of their FERC hydroelectric project licenses to promote fish and wildlife and their habitats within the Lewis River watershed. By this letter, WDFW recognizes PacifiCorp and Cowlitz County PUD for their efforts to improve fish, wildlife, and their habitats.

Thank you for the opportunity to comment. If you have any questions concerning this letter, please feel free to contact Kessina Lee at (360) 906-6704, kessina.lee@dfw.wa.gov, or Bryce Glaser at (360) 906-6765, bryce.glaser@dfw.wa.gov.

Sincerely,

Kelly Susewind
Director

Encl: Attachment A, including comments on Environmental Report, Strategic Plan, Implementation Monitoring Plan, and Bull Trout Plan

Attachment A

Washington Department of Fish and Wildlife Comments on Application for License Amendment, Hydroelectric Project FERC Nos. P-935, P-2071, P-2111, and P-2213

Washington Department of Fish and Wildlife
Natural Resources Building
1111 Washington Street SE
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May 13, 2020

Washington Department of Fish and Wildlife Comments on Application for License Amendment, Hydroelectric Project FERC Nos. P-935, P-2071, P-2111, and P-2213

Introduction

As noted in the cover letter for these comments, the following input from the Washington Department of Fish and Wildlife (WDFW) on PacifiCorp's and Cowlitz County Public Utility District No. 1's (Utilities) draft non-capacity amendment applications is technical in nature. It does not indicate agreement by WDFW to amend the project licenses or modify the 2004 Settlement Agreement. The Utilities claim that "New information" presented by the Utilities under Section 4 of the Settlement Agreement justifies the proposal to provide funding for habitat restoration in lieu of passage for anadromous fish as required under Section 4 of the Settlement Agreement. Rather, based on the mandate in Revised Code of Washington (RCW) 77.57.030 requiring fishways at dams and obstructions, WDFW's position remains that fish passage is required at these dams. The biological basis for the law recognizes that access to habitat above dams is essential to maintain migratory fish populations, including salmon.

Background

On April 11, 2019, the National Marine Fisheries Service (NMFS) Assistant Administrator for Fisheries provided PacifiCorp and Cowlitz County Public Utility District No. 1 with written notification (In Lieu Letter) entitled *Fish Passage Determination at the Lewis River Hydroelectric Projects*. The In Lieu Letter indicated that NMFS had made a preliminary determination to remove the passage facilities requirement for "Merwin Downstream Facility" and "Yale Upstream Facility" in Lake Merwin from the agreement, and to defer a decision on the completion of "Yale Downstream Facility" and "Swift Upstream Facility". In lieu of fish passage, funds would be made available for habitat restoration above Swift reservoir. This has been referred to by NMFS as an "In-Lieu Program".

Additionally, NMFS proposed requiring immediate restoration and monitoring activities if the proposed decision becomes final, and that all restoration and monitoring plans would require Aquatic Coordination Committee (ACC) approval to determine efficacy of the In-Lieu Program. Comments provided herein address *Volume II – Exhibit E – Environmental Report* and attachments for the draft non-capacity amendment applications. Our comments are based upon a review of the application materials for the *Yale Hydroelectric Project FERC Project No. P-2071 Application for License Amendment*. However, given the similarity in the other draft non-capacity amendment applications, these comments apply to all of the above referenced applications. Comments on the *Draft Lewis River Merwin In Lieu Program Strategic Plan, Draft Lewis River Bull Trout Passage Plan* and *Draft Lewis River Basin Implementation Monitoring Plan* review are also provided below.

In preparing these comments, WDFW reviewed the Environmental Report through the lens of requirements in the Federal Power Act (FPA) and applicable implementing regulations, the In Lieu Letter, the 2004 Settlement Agreement and the Lower Columbia Fish Recovery Board's 2010 *Washington Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan*.

1. Comments on Environmental Report

E.1.0 Introduction

E.1.1 Proposed Action

WDFW proposes a procedure for parties to the Settlement Agreement to consider amending that agreement. The Utilities state that they "…seek to amend their licenses and the incorporated fishway prescriptions…" but do not state a need to amend the Settlement Agreement in the draft non-capacity license amendment applications. Deferring fish passage construction into and out of the Yale Reservoir until 2031 and 2035, respectively, significantly changes the schedule for construction currently listed in the Settlement Agreement. WDFW contends that a separate process to amend the Settlement Agreement should occur prior to consideration of the Utilities' draft non-capacity license amendment applications. The Settlement Agreement authorizes a process for the Services to determine whether "New Information" submitted by a Party shows that fish passage is "inappropriate" in one or both reservoirs. The Settlement Agreement does not provide a definition of "inappropriate" and leaves it up to interpretation. WDFW has defined "inappropriate" as the ability to produce anadromous fish population abundances with habitat restoration that are equal to or greater than what would occur with passage through Yale and/or Merwin reservoirs without considering the cost of fish passage in comparison to the amount of the in lieu funds specified in the Settlement Agreement. As a party to the Settlement Agreement, WDFW did not agree that such New Information would trigger deferment of fish passage. As such, a procedure to consider amending the Settlement Agreement should occur.

E.4.1 Fish, Wildlife and Botanical Resources (18 CFR 4.51(f)(3))

E.4.1.1 Fish Resources

18 CFR § 4.201 - Contents of application (c) Required exhibits for non-capacity related amendments, provides that "[a]ny application to amend a license for a water power project that would not be a capacity related amendment as described in paragraph (b) of this section must contain those exhibits that require revision in light of the nature of the proposed amendments." As such, the Utilities have provided the majority of the revisions in *Volume II – Exhibit E – Environmental Report* of the draft non-capacity license amendment applications.

18 CFR § 4.51 (f)(3) indicates that the report must include:

> *(iii) A statement of any existing measures or facilities to be continued or maintained and any measures or facilities proposed by the applicant for the mitigation of impacts on fish, wildlife, and botanical resources, or for the protection or improvement of such resources, including an explanation of why the applicant has rejected any measures or facilities recommended by an agency and described under paragraph (f)(3)(ii) of this section.*
>
> *(iv) A description of any anticipated continuing impact on fish, wildlife, and botanical resources of continued operation of the project, and the incremental impact of proposed new development of project works or changes in project operation.*

E.4.1 Fish, Wildlife and Botanical Resources (18 CFR 4.51(f)(3)) in the Environmental Report discusses long and short-term impacts for the proposed bull trout fish passage facilities and restoration actions under the Merwin In-Lieu Program. It fails to fully describe the opportunities lost by eliminating fish passage through Merwin Reservoir and from delaying the provision of fish passage through Yale Reservoir. Without a full description of the opportunities lost, a comparison and analysis of the incremental impact of the proposal cannot be adequately considered. The Utilities provide that:

> *The proposed project results in a delay of anadromous fish passage into Yale reservoir and associated tributaries or a delay in habitat improvement projects within the Lewis River Basin, beyond what was previously considered in earlier assessments. A deferred decision on the action to implement will delay benefits to anadromous fish populations in the North Fork Lewis River Basin if fish populations increase such that aquatic habitat becomes limited. Partial passage is currently provided, allowing for upstream passage from Merwin Dam to upstream of Swift Dam and allowing for downstream passage from Swift Dam to downstream of Merwin Dam.*

Relying on in lieu habitat restoration for significant population benefits is generally riskier than relying on additional fish passage. While fish passage at a high head dam is not without risk and a need for adaptive management to ensure adequate collection efficiencies, delaying passage at Yale guarantees the absence of salmon from Yale Reservoir and its tributaries.

Although the Utilities provide a thorough description of potential benefits to fish and wildlife from habitat restoration, the analysis does not address the negative effects of abandoning fish passage through Merwin Reservoir and the subsequent impact to the assumptions in the Lower Columbia Fish Recovery Board's 2010 *Washington Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan*. The report on fish, wildlife, and botanical resources is required, per 18 CFR § 4.51 (f)(3)(iv), to include "*A description of any anticipated continuing impact on fish, wildlife, and botanical resources of continued operation of the project* …" The impact to fish, wildlife, and botanical resources from continued lack of passage through Merwin and Yale reservoirs has not been described here.

The evaluation of fish, wildlife, and botanical resources in the Environmental Report is unrepresentative of the full scope of possible impacts and options, and is therefore incomplete and inadequate.

E.4.1.1.2 Short-term Impacts to Fish

Please check that all references in text are included in *E.5.0 References (18 CFR 4.51(f)(7))*. The WSDOT 2019 citation for underwater noise propagation is not in the reference section.

E.4.1.2 Wildlife and Botanical Resources

The following citation should be used for "Washington Department of Fish and Wildlife (WDFW) has designated a number of cover types in the vicinity of the Lewis River Projects as priority habitats, including: caves, freshwater wetlands, fresh deepwater, streams, old-growth and mature forest stands, Oregon white oak woodlands, riparian areas, rural open space, areas with abundant snags and logs, and talus": Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington, p. 292.

E.4.1.2.3 Long-term Impacts to Vegetation and Wildlife Habitat

The draft non-capacity license amendment applications rely on the premise that restoration will achieve anadromous fish population abundances equivalent to or greater than the abundances that would occur with passage through Yale and/or Merwin reservoirs. In addition, the In Lieu Letter states "[m]onitoring and evaluation of habitat restoration projects to validate the efficacy of results of the EDT [Ecosystem

Diagnosis and Treatment] analysis will be required" and '[t]he empirical fish population benefits documented from the implementation of the Merwin in-lieu habitat restoration program and its associated monitoring program will be considered prior to NMFS determining whether fish passage is "inappropriate". As such, the habitat restoration proposed by the Utilities in the Strategic Plan, and the resulting fish population abundance, should increase to a level equal to or beyond what would occur with fish passage, by design. However, the Environmental Report *Long-term Impacts to Vegetation and Wildlife Habitat* section notes the uncertainty inherent in favoring restoration at the expense of passage when it states "[f]ish habitat improvements would *likely* increase fish production, which would provide more food for wildlife that feed on fish including black bears, bald eagles, osprey (*Pandion haliaetus*), and common mergansers (*Mergus merganser*)" (emphasis added). The In Lieu Letter also identifies the uncertainty of "…the realized benefits (adult abundances) of reintroduction/fish passage, and in-lieu habitat restoration" as well as "…whether there is enough total habitat available to restore to achieve benefits equivalent to passage, enough time to realize benefits, and the likelihood of achieving pristine conditions…" This uncertainty should also be reflected in *E.4.1.1 Fish Resources*.

In conclusion, the Environmental Report is insufficient and should be revised, then reissued for another consultation period for the following reasons:

- A separate process to amend the Settlement Agreement should occur before FERC considers the draft non-capacity license amendment applications.
- *E.4.1 Fish, Wildlife and Botanical Resources (18 CFR 4.51(f)(3))* fails to fully describe the opportunities lost by not providing fish passage through Merwin Reservoir and from delaying the decision to provide fish passage through Yale Reservoir. The evaluation of fish, wildlife, and botanical resources in the Environmental Report is not representative of the options and does not include impacts on regional salmon recovery plans, such that it is incomplete.
- *E.4.1.2.3 Long-term Impacts to Vegetation and Wildlife Habitat* correctly reflects the considerable uncertainty of the ability of in lieu habitat restoration to achieve its stated objectives when it states "[f]ish habitat improvements would *likely* increase fish production…"(emphasis added), in contrast to the relatively high level of certainty provided by effective fish passage. The uncertainty associated with the fish response to restoration relative to response to effective passage should also be reflected in *E.4.1.1 Fish Resources*.

2. Comments on Strategic Plan

This section of WDFW's comments address the restoration plan, specifically the *Draft Lewis River Merwin In Lieu Program Strategic Plan* (Strategic Plan), an appendix of *Volume II – Exhibit E – Environmental Report* for the draft non-capacity amendment. The *Draft Lewis River Basin Implementation Monitoring Plan, Draft Lewis River Bull Trout Passage Plan* and *Environmental Report* reviews are provided separately.

In the In Lieu Letter, NMFS recommended that all restoration and monitoring plans be approved by the ACC, and that the Strategic Plan restoration criteria include:

- Restoration activities take place in tributary habitats above Swift Reservoir.

- Restoration activities address at a maximum three of the limiting factors identified by the EDT analysis, for a reach chosen to be restored.

- Restoration efforts focus on stream reaches above Swift reservoir that are known to support all three species since reintroduction efforts began in 2012 and will benefit all three species, and are unlikely to be affected by future natural and anthropogenic causes. These include:
    - Clearwater River
    - Clear Creek
    - North Fork of the Lewis River
    - Drift Creek

The Settlement Agreement, in section *7.6.2 Mitigation Measure Proposal, Review, and Selection,* provides that the Utilities "…shall develop, in consultation with the ACC and with the approval of the Services, (a) a strategic plan … to guide mitigation measure development, solicitation, and review; and (b) administrative procedures to guide implementation of the In Lieu Fund." Section 7.6.3 Guidance and Criteria for Mitigation Measure Approval and In Lieu Fund Expenditures, specifies the objective as "*…achieving benefits to anadromous fish populations equivalent to or greater than benefits that would have occurred if passage through Yale and/or Merwin reservoirs had been provided, as determined by the Services based on the best information available at such time*."

WDFW offers the following general comments on the Strategic Plan:

- From WDFW's perspective, ACC approval of restoration and monitoring plans, as specified by the Service's preliminary determination, should occur before the plans are included in the applications for non-capacity license amendment submitted for FERC approval. Should the amendments be approved by FERC, the plans become final and would be incorporated into the licenses. Thus, any future changes would require amendments to the plans and the accompanying regulatory process. The Utilities should either work with the ACC to gain approval of the plans before submission to FERC, or the plans should not be included with the amendment applications. The Utilities provided the ACC preliminary draft plans for a 30-day review. WDFW provided comments on August 29, 2019. In addition, WDFW believes that the Settlement Agreement recognizes the individual and collective expertise of the parties that signed the agreement, and explicitly sought to provide for that expertise to play a significant role in the consultation and implementation fish habitat and recovery objectives going forward. For this reason, WDFW believes the comments from other Settlement Agreement Parties to the Utilities should be appended as consultation materials to the non-capacity license amendment applications submitted to FERC. Including a full and broad view of the consultation and comments on the draft non-capacity amendments embraces the spirit of the Settlement Agreement as well.

- The Utilities developed the Strategic Plan without input from the WDFW as an ACC member, and the Utilities, from WDFW's perspective, did not receive support from the ACC on the elements within the plan as it was being developed. This directly contradicts the Service's proposed requirement in the preliminary determination letter that "At a minimum, implementation and monitoring would require … ACC approval of all restoration and monitoring plans." The lack of consultation with the ACC in drafting the Strategic Plan is not only an inefficient way to engage interested parties and stakeholders, but it is contrary to the spirit and terms of the Settlement Agreement that created the ACC. The Utilities should work collaboratively with the ACC to produce a Strategic Plan the ACC supports, and this support should come before a Strategic Plan is included in any non-capacity license amendment application.

- The administration of the Merwin In Lieu Program and the Habitat Restoration Plan (HRP) are layered with unnecessary committees, steps, and procedures. WDFW encourages the Utilities to develop a streamlined approach for the Merwin In Lieu Program and the associated Strategic Plan and HRP. Eliminating unnecessary process will increase the probability of achieving benefits to fish and habitat in the shortest timeframe possible and monitoring can be initiated with minimal delay.

WDFW offers the following specific comments:

1.0 Introduction
Page 4

- Please include a legend in Figure 1. It is unclear if the red dots are the upper extent for fish passage or used to identify the stream/river.

- The Strategic Plan identifies previous restoration work in the Lewis River watershed by sponsor. Please identify the location in the watershed the sponsors completed restoration activities. Since NMFS designated that restoration efforts focus on stream reaches above Swift reservoir, limiting the list to projects above Swift reservoir would be more appropriate.

1.1 Document Organization
Page 5

- It currently inappropriate to state "…*it is the intent of the Utilities, Services, and Aquatic Coordination Committee (ACC) to develop a framework for an* [Habitat Restoration Plan (HRP)] *that will include reach and site-specific recommendations for restoration and enhancement measures*." WDFW believes that the Utilities have not confirmed with the ACC that it supports development of a framework for HRP or the content of the HRP.

1.2 Roles and Responsibilities
1.2.2 Program Administrator
Page 6

- If the organization of the Merwin In Lieu Program administration is maintained, WDFW believes the ACC should have the opportunity to review the Scope of Work before a Request for Proposals is released for the Program Administrator position. In addition, WDFW would like to participate on any interview panel.

Page 7

- Please include additional information for "…solicit[ing] matching funding for habitat improvement grants or other funding elsewhere in the Lewis River watershed…" where "Utility funded habitat enhancement projects will be conducted above Swift Reservoir…" and "…matching funds contributed by others will be unrestricted and available for enhancement projects elsewhere in the Basin, including reaches downstream of Merwin and in the mainstem Columbia River." Additional information is necessary to determine who benefits—the restoration by the Utilities, or the projects with unrestricted funds. It seems unlikely that matching funds would be used to increase the amount of restoration above Swift Reservoir.

- The Strategic Plan alludes to the geographic scope of the HRP in several sections:

  Page 7 - Above Swift, downstream of Merwin Dam and including the East Fork Lewis River watershed and mainstem Columbia River per the geographic scope of where projects with matching funds can occur;
  Page 11 - The Lewis River per the goal listed in Table 2; and
  Page 12 - Areas under the purview of the Lower Columbia River Fish Recovery Board per the footnote for Lower Columbia River watershed within the goal provided in *2.2 Restoration Goals and Objectives.*

  From WDFW's perspective, the Utilities did not seek input from the ACC before establishing the geographic scope of the HRP. The ACC should decide whether the HRP should correspond with the scope provided in the In Lieu Letter to focus above Swift Reservoir, or that proposed in the Strategic Plan. Regardless, the geographic scope of the HRP should be consistent throughout the Strategic Plan.

1.2.4 Aquatic Coordination Committee
Page 8

- The role of the ACC is listed as providing "…technical oversight and peer review capacity … including but not limited to: [p]roviding a sub-group of habitat experts to review and support completion of a draft HRP; [r]eviewing and approving a final HRP; and [s]upporting HRP actions within respective ACC representative's organization." Other activities are mentioned throughout the Strategic Plan but are not included here. As proposed, the ACC plays a very limited role in the Merwin In Lieu Program. At a minimum, WDFW believes the ACC should have input on selecting the Program Administrator, approve the TAC list of prioritized specific habitat work to be completed, and the Utilities should have obtained ACC approval of the restoration goals and objectives when drafting the Strategic Plan and HRP framework.

2.0 In Lieu Habitat Restoration Plan
2.1 HRP Background and Status
Page 8

- From WDFW's perspective, the ACC had no role in the initial development of the studies to be implemented and the methods of those studies. Only after the contracts were awarded did the ACC become involved. The ACC guided selection of EDT input parameters/assumptions, but provided very little other input for the studies. The main role of the ACC was to review the final

New Information Report. To say the New Information Report was developed by the ACC is inaccurate.

Page 9

- WDFW suggests the Utilities verify with the NMFS the reasons why it selected Clearwater River, Clear Creek, North Fork of the Lewis River, and Drift Creek. The Strategic Plan states that "[e]nhancing and protecting these reaches recommended by the Services will focus on strongholds, or areas with the highest quality habitat and highest densities of spawning spring Chinook, steelhead, and coho." Yet, NMFS indicated to the ACC that these reaches were selected because EDT analysis predicted the largest increases in abundance of Chinook, coho, and steelhead. In addition, WDFW believes the ACC should discuss if focus should be on protection or restoration.

- The New Information identified the 25 highest priority reaches throughout the basin, but did not rank them. The ACC used the New Information list of the 25 highest priority reaches, as well as best professional judgement to create a new ranked reach list for the Aquatic Fund Program project selection. This list should be acknowledged and used within the process. In addition, please identify the ranking of the reaches selected by the Services.

Page 11

- Figure 4. and other sections within the Strategic Plan propose to prioritize protection and preservation above restoration of watershed processes and habitat features. This is contrary to the goals and objectives outlined in the In Lieu Letter and in Settlement Agreement section 7.6.3. Prioritizing protection and preservation projects before restoring habitat functions and features is not likely to meet the In Lieu Letter or Settlement Agreement goals/objectives. From WDFW's perspective, not only should the ACC collectively determine the goals of the Merwin In Lieu Program and HRP, it should also collectively determine the prioritization of protection and preservation, restoring watershed processes, and restoring habitat features.

- The reference listed in the Restoration Goal found in Table 2, "[s]upport re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead, and achievement of the Lewis River SA Outcome Goal (Defined in Settlement)", is misleading. "Defined in Settlement" only applies to "…Lewis River SA Outcome Goal…" and "…substantial increases in numbers of ESA listed salmon and steelhead…" as it pertains to reintroduction. "Support re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits…" are not found or defined in the Settlement Agreement. Those references should be removed.

- HRP restoration goals are included in several sections of the Strategic Plan and are internally inconsistent:

Page 11 – “Support re-establishment and improvement of the form and function of aquatic habitats of the Lewis River that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead, and achievement of the Lewis River SA Outcome Goal (Defined in Settlement)”.
Page 12 – “…support re-establishment and improvement in the form and function of aquatic habitats of the Lower Columbia River watersheds that collectively promote large-scale environmental benefits, substantial increases in numbers of ESA listed salmon and steelhead and achieve the Lewis River SA Outcome Goal.” Areas under the purview of the Lower Columbia River Fish Recovery Board.

The restoration goals listed above also do not match the goals/objectives of the In Lieu Letter or Settlement Agreement:

Services Letter – “…achieve benefits equivalent to passage, enough time to realize benefits, and the likelihood of achieving pristine conditions if in-lieu restoration was selected at Yale.”
Settlement Agreement section 7.6.3 – “...achieving benefits to anadromous fish populations equivalent to or greater than benefits that would have occurred if passage through Yale and/or Merwin reservoirs had been provided, as determined by the Services based on the best information available at such time.” This subsection also specifies that “In Lieu Fund monies will be spent on mitigation measures that collectively contribute to meeting the [goal/] objective…”

From WDFW’s perspective, the goal(s) and objectives of the Merwin In Lieu Program and HRP should be determined collectively with the ACC. The ACC should discuss the restoration goals found in the Strategic Plan, In Lieu Letter, and Settlement Agreement to determine the appropriate restoration goal for the HRP and modify the framework accordingly. This should be done before the ACC considers approval of the Strategic Plan.

2.2 Restoration Goals and Objectives
Page 12

- One of the objectives listed for the HRP is:

“Consistency with the Lower Columbia Salmon Recovery Plan. Planning, to the extent possible, will be integrated with strategies developed under other regional processes to recover salmon, steelhead, and bull trout listed under the federal ESA.”

The top prioritized measure for the Upper North Fork Lewis Basin in Lower Columbia Salmon Recovery Plan is “[r]estore access through hydropower system.” Sub-measures include “A) Restore access above Merwin, Yale, and Swift Dams for anadromous salmonids and B) Restore access upstream and downstream through the Dams for Bull Trout and other resident fish.” By eliminating fish passage through Merwin and delaying the decision for Yale, the HRP is already inconsistent with the objective above.

- Objectives are usually measurable and must be accomplished in a defined time period. An example of this can be found in the In Lieu Letter Table 1 listing the expected fish production from passage and without, and the monitoring period of 10 years. The above objective and the others listed in the section appear to be guiding principles for the HRP rather than objectives in that they lack time period benchmarks. The criteria found in *2.6 Project Ranking* to prioritize (rank) projects for funding align more closely with objectives for the goals listed in the In Lieu Letter and Settlement Agreement. "…[T]hese will include: the expected increase in juvenile and adult spring Chinook, coho, and winter steelhead abundance (based on existing EDT outputs); whether the project benefits all three focal species; the degree that it would provide resilient habitat over changing conditions (restore processes); cost effectiveness; and many other technical and nontechnical criteria (e.g., access and feasibility)."

In conclusion, WDFW believes the Strategic Plan and HRP framework are inconsistent with the In Lieu Letter and Settlement Agreement goals and objectives. In addition, the Strategic Plan was not developed in coordination with the ACC, and as such the ACC has not had the opportunity to collectively determine the goals and objectives of the HRP—the foundation of any habitat restoration plan. The Strategic Plan should be rewritten in collaboration with the ACC, and approval obtained from the ACC, before it is attached to the draft non-capacity license amendment application to be submitted to FERC. WDFW encourages the Utilities to collaborate with the ACC to develop a Merwin In Lieu Program and the associated Strategic Plan and HRP that streamlines administrative and project selection processes, and focuses on the goals and objectives of the Settlement Agreement and Services' letter to achieve benefits to fish and habitat in the shortest timeframe possible.

3. Comments on Monitoring Plan

This section of WDFW's comments address the *Draft Lewis River Basin Implementation Monitoring Plan (MP)*, an appendix of *Volume II – Exhibit E – Environmental Report* for the draft non-capacity amendment applications. NMFS would require that restoration and monitoring activities begin immediately upon the proposed decision becoming final. In addition, NMFS requires approval from the Aquatics Coordination Committee (ACC) of all restoration and monitoring plans.

In reviewing the MP, the WDFW has relied on applying the requirements identified in the Federal Power Act (FPA), applicable implementing regulations, the In Lieu Letter, the 2004 Settlement Agreement, the Lower Columbia Fish Recovery Board's 2010 *Washington Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan* and NMFS' Guidance for monitoring recovery of Pacific Northwest salmon and steelhead listed under the federal Endangered Species Act (ESA, Crawford and Rumsey 2011).

In lieu of upstream passage at Yale and downstream passage at Merwin, the NMFS justification for habitat restoration relied on the abundance estimates produced by a PacifiCorp and NMFS EDT analysis, which indicated that restoration of habitat above Swift Dam may result in the same average adult abundance of salmon and steelhead as would be achieved by upstream passage at Yale and downstream passage at Merwin (Table 1). In addition, NMFS indicated this approach benefitted the ESA-listed Lower Columbia spring Chinook population that is struggling to recover. The restoration would provide a boost to this species. Since spring Chinook salmon spawning in Merwin was presumed to be negligible, NMFS noted that the habitat restoration was less costly than providing fish passage.

Table 1. Comparison of EDT adult abundance for reintroduction/fish passage to Lake Merwin, and full restoration of 22.5 km of tributary habitat above Swift Reservoir using $20 million in-lieu monies. Percentages represent the collection efficiency from NMFS April 11, 2019, In-Lieu letter.

	Reintroduction			Restoration (22.5 km)		
Species	30%	60%	95%	30%	60%	95%
Coho Salmon	177	378	598	225	450	698
Winter Steelhead	18	46	73	34	56	68
Chinook Salmon	0	0	0	113	203	293

Given the substantial uncertainty in the estimates of increased productivity and capacity from the EDT model, NMFS required immediate restoration and monitoring to test the efficacy of restoration to increase adult abundance. At a minimum the implementation and monitoring would require: 1) ACC approval of the restoration and monitoring plans, 2) restoration and monitoring to occur in areas above Swift Reservoir and monitoring to be statistically based with sufficient power to determine independent fish population estimates from restoration using Before-After-Control-Impact (BACI) or similar statistical design, 3) restoration shall address a maximum of three limiting factors for each reach, 4) restoration to focus on stream reaches that can benefit all three species (coho salmon, winter steelhead, and spring Chinook salmon) including Clearwater River, Clear Creek, NF Lewis River, and Drift Creek.

The purpose of this review is to determine if the proposed MP is sufficient to assess the adult salmon and steelhead response due to habitat restoration as described in the In Lieu letter.

Proposed Monitoring Plan

The proposed MP was developed to evaluate the performance of the Merwin In Lieu Program, including those habitat enhancement projects the Merwin In Lieu Program will select and is expected to install over the next five to eight years. The MP states that the proposed monitoring can be used for three major purposes: "1) adaptive management during the implementation of the Merwin In Lieu Program, 2) to determine if the Merwin In Lieu Program has improved habitat conditions enough to produce increases in salmon and steelhead estimated by the EDT model, and 3) to inform the Services decision on Yale Downstream and Swift Upstream Facilities in 2031 and 2035, respectively." The MP focuses on two requirements in the In Lieu letter: 1) reach scale monitoring in areas above Swift Reservoir with sufficient statistical power to determine independent fish population benefits from restoration using Before-After-Control-Impact (BACI) or similar statistical design, and 2) population level monitoring to determine if the fish response met the predicted EDT population level response due to restoration to mitigate for no fish passage in Merwin. This review focuses on monitoring the fish response.

Does the proposed MP use a statistically based design with sufficient power to determine the independent fish population benefits from implementation of the habitat restoration program?

The MP proposes to "monitor physical response to large wood (LW) and floodplain restoration using a simple BACI design, monitoring of riparian planting (if it occurs) and road removal using a before-after (BA) design, and monitoring of reach-scale juvenile fish abundance to LW and floodplain projects using an extensive post-treatment (EPT) experimental design" (MP, page 10). WDFW agrees that the most robust designs to test fish population response involve some variation of a BACI design. Based on WDFW's experience for restoration fish response monitoring, WDFW believes that this plan is a good start but does not meet the criteria for determining independent fish population benefits. The proposed design compares an index of juvenile fish abundance in control and treatment reaches rather than comparing the differences in population abundance or density between those reaches. Additionally, a fundamental requirement for any monitoring plan is that it produces unbiased and precise abundance estimates (Crawford and Rumsey 2011). Study design and analysis elements, such as assumptions and assumption testing, detection and treatment of outliers, model validation, and the expected precision for juvenile abundance estimates are missing (Zuur et al. 2010, Zuur and leno 2016).

To evaluate the physical (habitat) response to restoration, BACI designs (Stewart-Oaten and Pence 2001) are proposed, but only EPT designs are proposed for fish monitoring. The EPT approach only evaluates multiple projects post-treatment (after restoration has occurred) using paired-treatment (restored) and control reaches and standardized data collection methods (MP, Table 3). It does not collect important before and after information. BACI are among the most powerful tools to use for environmental and population response interventions because they allow treatment impacts to be distinguished from background time effects and differences between treatment and control sites (Underwood 1994). The MP listed that it may take too long to detect a fish response as one rationale for not implementing BACI designs, but if the restoration is effective and sufficiently large, fish responses are rapid and detectable (Solazzi et al. 2000, Bouwes et al. 2016). While it is very challenging to implement BACI designs at the population scale for fish population response monitoring, WDFW believes BACI designs can be implemented in tributary and reach scale fish response monitoring. WDFW recommends implementation of BACI designs for tributary and reach scale fish response monitoring because they provide a more robust study design.

More specifically, the proposed EPT plan uses relative index of abundance from snorkel surveys at control and treatment reaches using paired t-tests and correlation analyses (MP, page 31). The basic assumption for restoration is that a positive fish response and p-values from paired t-test should be one-sided. As mentioned above, an essential part of the analysis are the assumptions of the t-test (e.g. normality, homogeneity in variances, etc.) and outliers. The authors should indicate how they will test for assumptions and outliers, and other analysis methods that will be used if t-test assumptions are not met (Ramsey and Schafer 2002). The authors should discuss in more detail issues with type I and II errors and should state the significance level, which is generally $\alpha=0.05$. There has been a growing concern regarding the use of p-values and we recommend reporting the 95 % confidence or credible interval. These same concerns also apply to the proposed correlation analysis. WDFW could not find any information on how the different habitat and fish response metrics would be interpreted. For example, if there were significantly different results by year or species, one would conclude that restoration provided inconclusive evidence that the fish response was positive. The authors may consider robust regression approaches using student's t distribution to more adequately address year and species analyses. A more robust approach may include generalized liner mixed models (GLMM) for count data using Poisson or Negative Binomial distributions (Zuur et al. 2009).

Another concern is that fish response monitoring is limited to juvenile salmonid monitoring in the later summer and late winter/spring. This assumes that the summer and winter parr life stages are limiting. For example, the MP indicates that fine sediment may be a limiting factor. If this is the case, incubation survival may be limiting and egg box survival studies would be appropriate (Johnson et al. 2012). Also, these life stages may not fully evaluate spring Chinook juveniles. Historically, spring Chinook salmon in western Washington exhibited a strong subyearling life history but high elevation with colder-water temperatures may also produce yearling life histories (Beechie at al. 2006, Schroeder et al. 2016). The subyearling life history pattern is dominant in the Kalama River spring Chinook salmon population (Wilson et al. 2019). Since the current MP is likely to have low statistical power for spring Chinook salmon, we recommend a BACI design for year-round tributary outmigrant trapping for spring Chinook salmon to evaluate restoration. WDFW implements year-round trapping supplemented with PIT tagging for spring Chinook in the Chiwawa River, a tributary to the Wenatchee River. This type of smolt trapping project could be used as a basis to develop BACI designs to evaluate the effectiveness of restoration in increasing juvenile outmigrant abundance.

The basic assumption in the MP for reach scale fish response monitoring is that snorkel observer efficiency is constant between treatment and control reaches. If this assumption is not met this study design will produce biased results. Observer efficiency is variable based on experience, environmental condition, habitat, and other variables (Murdoch et al. 2018). More importantly, this assumption cannot be verified and this approach provides an index, not an estimate, of population abundance. Therefore, the proposed MP approach, using snorkel surveys, will not provide an estimate of the improvement of population size due to restoration, which is one of the conditions in the In Lieu letter. If the authors choose to snorkel, a mark-resight approach may be used (Rawding and Cochran 2005, Buehrens and Cochran 2018). In the mark-resight approach marks/tags visible to snorkelers are applied in the first sampling event and the second event (snorkel survey) is conducted after marked and unmarked fish have the time to mix. When using this closed population modeling approach, it is important to assess model assumptions including heterogeneity in capture probability, tagging/marking effects, and closure (Schwarz and Taylor 1998). Alternately, mark-recapture could be used, but WDFW does not recommend other typical methods, such as depletion and Binomial mixture models, as it is difficult to meet the assumptions of these methods to obtain unbiased estimates (Rosenberger and Dunham 2005, Barker et al. 2018).

Does the proposed MP provide the population level monitoring needed to determine if the fish response met the predicted EDT population level response due to restoration, to mitigate for no passage at Merwin?

As pointed out in the MP, it is challenging to determine population level responses, and approaches to estimate spawners and smolts are likely the best approaches to move forward. However, the population level monitoring in the MP did not meet the requirements in the In Lieu letter. In the MP it states: “The main question that population level monitoring above Swift Dam would be designed to answer is: Has restoration of habitat under the In Lieu Program resulted in a statistically significant increase in the numbers of smolts produced and adult salmon and steelhead successfully spawning above Swift Basin?” WDFW agrees that it is important to have a monitoring design to support a population level response to restoration. However, the study design must quantify that the adult population response from restoration was greater than the NMFS restoration scenario to mitigate for no fish passage at Merwin. Since the MP did not focus on the requirements in the In Lieu letter the population level, monitoring is inadequate.

The MP evaluated different approaches, but WDFW found it difficult to understand the population level recommendations. Page 31 of the MP states: "Population level monitoring of smolts, effective breeders, and smolts per breeder and spawner will be analyzed using both t-test and trend-based analysis as described in population level monitoring section." Page 23 states: "the following will be conducted: 1) before and after monitoring of smolts using the FSC to measure changes in smolt numbers and smolts per adult over the long-term, and 2) begin collecting genetic samples from all or a suitable sample of adults transported upstream of Swift Dam (2020) and a subset of juveniles at FSC (2021) to measure successful breeders and smolts per breeder, and 3) using before and after habitat data collected in restored reaches and EDT modeling to determine if habitat improvements can support juveniles and adults at or above levels predicted by EDT model before restoration." These inconsistencies must be reconciled.

The MP recommends t-test and trend analysis of restoration response indicators including smolts, effective breeders, and smolts per breeder and spawner. As mentioned above, this is not an appropriate analysis; the indicators of smolts and breeder/spawners is a function of the number of adult salmon and steelhead released and the amount of habitat. In other words: if the breeder/spawner to smolt relationship follows a Beverton-Holt (BH) curve; the more adults released, the more breeders/spawners and smolts will be produced. Therefore, if 1,000 adults are released before restoration and 2,000 adults are released after restoration, the increase in smolts and breeders/spawners cannot be attributed only to restoration. The estimated number of breeders is based on the genetic mark-recapture methodology developed in Rawding et al. (2014). However, it is unclear how this relates to the population level response. A well deigned restoration program should increase fish abundance (Solazzi et al. 2000, Bouwes et al. 2016) which t-tests and trend analysis should confirm. However, t-test and trends are not able to provide evidence that the restoration abundance goals have been achieved, as they only address change in relative abundance.

It should be noted that to obtain unbiased estimates of breeders or smolts per breeder, closed mark-recapture assumptions are required to be met. Rawding et al. (2014) indicated that for genetic estimates of abundance it is critical to implement a sampling design to meet the equal catchability/heterogeneity assumption, which can be met by a representative collection of marked fish in the first sample with respect to their reproductive success and a representative sample of outmigrants in the second sample. Authors recognized this was impossible to meet with the first sample because adult reproductive success at the time of sampling was unknown, but it is important to collect a representative adult fish sample. WDFW recommends using a GLMM to test the null hypothesis of no difference between the offspring and variables influencing reproductive success. The MP authors should indicate how they will obtain representative first and second samples. The third approach is based on collection of habitat data before and after restoration to determine if the number of smolts and adults predicted by the EDT model increased. WDFW does not support this approach because it provides no empirical evidence that there was a smolt or adult increase in abundance.

What approach does WDFW recommend to evaluate a population level response?

The 2004 Settlement Agreement contains language regarding the use of in lieu funds if fish passage is not provided. Specifically, Section 7.6.3 indicates that in lieu funds are intended to be spent on:

“mitigation measures that collectively contribute to meeting the objective of achieving benefits to anadromous fish populations equivalent to or greater than benefits that would have occurred if passage through Yale and/or Merwin reservoirs had been provided.” The In Lieu letter from NMFS indicated the EDT model provided “the best available information for comparisons between benefits of reintroduction/fish passage and in lieu habitat restoration options for increasing salmon abundance.” The MP also identified that a purpose of monitoring was to “determine if the Merwin In Lieu Program has improved habitat conditions enough to produce increases in salmon and steelhead estimated by the EDT model.” Given the reliance by NMFS and PacifiCorp on the EDT model, WDFW believes the most defensible path forward is to set expectations for a numerical fish response to restoration based on the EDT model. In a September 2018 letter to the Services, WDFW recommended that current adult and smolt monitoring and Swift juvenile collection be improved to determine if habitat restoration produced the expected fish response. This would be accomplished by comparing the BH curve from EDT to the BH curve based on empirical data, which was done to assist with salmon and steelhead recovery developed by the Lower Columbia Fish Recovery Board (Rawding 2004). Bradford et al. (2005) proposed to evaluate the effectiveness of restoration based on freshwater spawner-smolt curves. They demonstrated that estimates of the effectiveness of restoration using freshwater spawner-smolt curves were more precise than those from monitoring the abundance of either spawners or smolts.

The EDT model characterizes the aquatic environment (habitat) of salmonids and uses species habitat relationships and life history trajectories to estimate population performance as described by the Beverton-Holt (BH) productivity and capacity parameters (Blair et al. 2009). Thus, the number of recruits (R) is a function of the spawners (S), productivity (number of offspring at low density; P) and capacity (the number of offspring at an infinite number of spawners; C) as defined in equation 1. The abundance at equilibrium (NEQ), sometimes referred to as average abundance, is defined as the number of recruits at replacement (equation 2), and the smolt productivity (Ps) and smolt capacity (Cs) are function of adult productivity and capacity and smolt to adult survival (SAS, equations 3 and 4).

$$R = S*P/(1-S*P/C) \qquad (1)$$
$$NEQ = C*(1-1/P) \qquad (2)$$
$$Ps = P/SAS \qquad (3)$$
$$Cs = C/SAS \qquad (4)$$

The NMFS re-run of the EDT model provided population performance parameters (P, C, and NEQ) for coho salmon, winter steelhead, and spring Chinook for the Swift, Yale and Merwin subpopulations for the current habitat condition referred to as the “Template condition.” The EDT model population performance was measured for pristine habitat or “Patient condition.” NMFS provided adult abundance (NEQ) for EDT for Merwin and adult abundance for adult restoration under the assumption that habitat would be returned to pristine in 22.5 km of habitat under different FCE scenarios (In Lieu letter Table 1.). The NEQ abundance for steelhead and coho salmon were similar between the Merwin and the restoration scenario. The spring Chinook adult salmon were estimated at 293 adults for restoration scenario and 0 adults for Merwin modeling because no spring Chinook salmon and only fall Chinook salmon were believed to use Merwin. It was assumed a 95% FCE (per the Settlement Agreement) and added the adults estimated from restoration (Table 1) to the EDT NEQ estimates for Swift and assumed restoration only increased capacity but did not change productivity. Equation 3 was used to estimate the BH curve under the Merwin In Lieu restoration scenario. The same process was repeated assuming that there was no fish passage into or out of the Yale Reservoir, this is referred to as the Merwin & Yale restoration scenario. The Yale NEQ values were used from the NMFS EDT model.

The spawner-to-adult BH curves for Swift under the patient, Merwin In Lieu restoration, Merwin and Yale In Lieu restoration, and template for the three species are found in Figure 1 and Table 1. In the NMFS EDT model, smolt to adult survival (SAS) was assumed to be 4% and equations 3 and 4 were used to estimate the adult to smolt BH curves for the three species (Figure 1 and Table 3). The results indicate the habitat restoration effort, to mitigate for no passage at Merwin, will lead to a modest increase in NEQ and C. However, to mitigate for no passage at Merwin and Yale, the restoration actions will need to be significant to yield near template conditions for all anadromous water above Swift Dam. It is very challenging to restore habitat conditions to near template conditions during the license period. If near template habitat conditions are achieved it is likely that periodic restoration action will be needed to maintain near template conditions until natural processes are fully restored (e.g. riparian condition that allow recruitment of LW).

NMFS chose the NEQ abundance target for restoration response needed to mitigate for no fish passage at Merwin. However, the NEQ abundance is a single data point in a spawner-recruit relationship. This point only occurs when there are high levels of escapement (Figure 1). Given that this is the initial reintroduction phase in the upper Lewis River, it is unlikely there will be many adult escapements near NEQ abundance to evaluate if restoration meets the abundance targets in Table 1 in the timeframe described in the In Lieu letter. Therefore, WDFW proposes the MP utilize collection of unbiased and precise estimates of spawner abundance, smolt abundance, and survival to validate the Merwin In Lieu BH curve for the three species of interest. WDFW recommends the spawner to smolt approach because rapid implementation of effective restoration in a few years could lead to rapid detectable changes (Solazzi et al. 2000, and Bouwes et al. 2016), allow sufficient spawner and smolt estimates to estimate the BH curve, and the robustness of this method as demonstrated by Bradford et al. (2005).

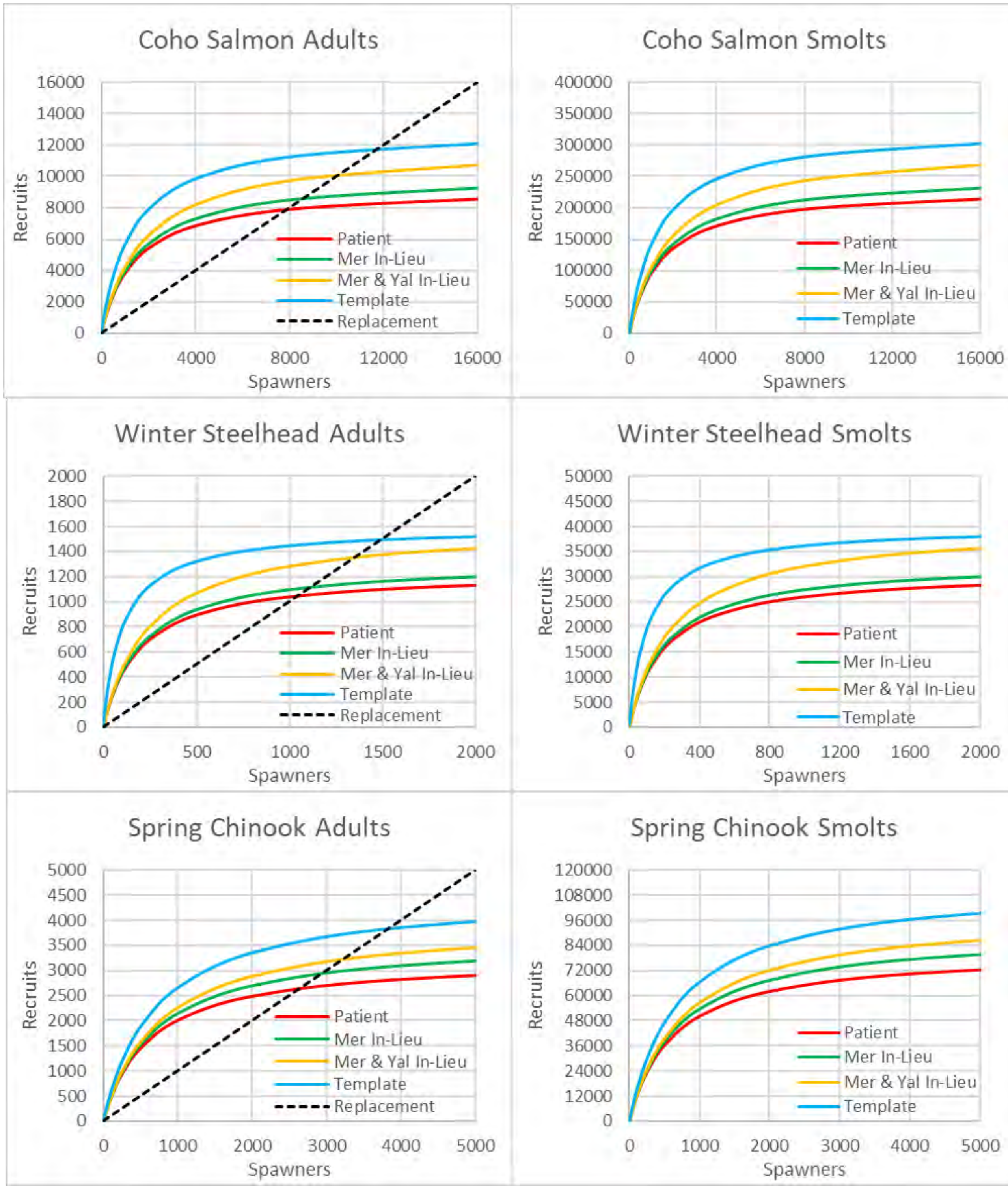

Figure 1. Beverton-Holt curves for Coho salmon, winter steelhead, and spring Chinook salmon for the area above Swift Dam. The lower line (red) is for the patient condition, next line (green) is based on restoration of habitat In Lieu of Merwin fish passage, the next line (light orange) is based on restoration of habitat In Lieu of Merwin and Yale fish passage, and upper line (blue) is for template condition.

Table 2. Ecosystem Diagnosis and Treatment (EDT) spawner to adult recruit estimates assuming 95% collection efficiency (per Settlement Agreement) and 4% smolt to adult survival. Patient and Template data from NMFS EDT and estimates for Merwin In Lieu and Merwin & Yale In Lieu as described in the text.

	Patient	Patient	Patient	Mer In-Lieu	Mer In-Lieu	Mer In-Lieu	Mer & Yal In-Lieu	Mer & Yal In-Lieu	Mer & Yal In-Lieu	Template	Template	Template
Adult	Coho	Steelhead	Chinook	Coho	Steelhead	Chinook	Coho	Steelhead	Chinook	Coho	Steelhead	Chinook
Productivity	6.4	6.4	5.2	6.4	6.4	5.2	6.4	6.4	5.2	9.9	15.2	6.4
Capacity	9371	1239	3263	10198	1320	3626	11969	1604	3995	13135	1601	4547
SAR	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
NEQ	7907	1045	2636	8605	1114	2929	10099	1353	3227	11808	1496	3837
Spawners	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits
1	6	6	5	6	6	5	6	6	5	10	15	6
2	13	13	10	13	13	10	13	13	10	20	30	13
4	26	25	21	26	25	21	26	25	21	39	59	25
8	51	49	41	51	49	41	51	50	41	79	113	51
16	101	95	81	101	95	81	102	96	82	157	211	100
32	200	176	158	201	177	159	201	182	160	309	373	196
64	392	308	302	394	313	305	396	326	307	604	605	376
128	753	493	553	758	505	562	767	542	571	1156	878	694
256	1395	705	945	1412	731	974	1441	811	998	2124	1134	1204
512	2428	899	1466	2480	941	1535	2573	1077	1598	3657	1328	1904
1024	3857	1042	2023	3990	1099	2157	4235	1289	2283	5722	1452	2684
2048	5464	1132	2498	5736	1199	2705	6256	1429	2905	7971	1523	3376
4096	6903	1183	2830	7342	1257	3099	8217	1512	3364	9921	1561	3875
8192	7950	1210	3031	8537	1288	3342	9744	1556	3652	11304	1581	4184
16384	8602	1225	3143	9294	1304	3478	10743	1580	3816	12151	1591	4358

Table 3. Ecosystem Diagnosis and Treatment (EDT) spawner to smolt recruit estimates assuming 95% collection efficiency (per Settlement Agreement). Patient and Template data from NMFS EDT and estimates for Merwin In Lieu and Merwin & Yale In Lieu as described in the text.

Adult	Patient Coho	Patient Steelead	Patient Chinook	Mer In-Lieu Coho	Mer In-Lieu Steelead	Mer In-Lieu Chinook	Mer & Yal In-Lieu Coho	Mer & Yal In-Lieu Steelead	Mer & Yal In-Lieu Chinook	Template Coho	Template Steelead	Template Chinook
Productivity	160	160	130	160	160	130	160	160	130	247.5	380	160
Capacity	234275	30975	81575	254950	33000	90650	299225	40100	99875	328375	40025	113675
SAR	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Sm Neq	197670	26135	65888	215114	27844	73217	252471	33834	80668	295206	37392	95913
Spawners	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits	Recruits
1	160	159	130	160	159	130	160	159	130	247	376	160
2	320	317	259	320	317	259	320	317	259	494	746	319
4	638	627	517	638	628	517	639	630	517	987	1464	636
8	1273	1229	1027	1274	1232	1028	1275	1240	1029	1968	2825	1266
16	2532	2365	2028	2535	2376	2033	2538	2406	2038	3913	5278	2504
32	5010	4394	3958	5019	4432	3977	5034	4540	3994	7733	9327	4899
64	9811	7696	7550	9845	7815	7621	9901	8157	7680	15111	15128	9394
128	18834	12329	13821	18957	12637	14059	19168	13556	14264	28893	21957	17354
256	34864	17637	23637	35290	18276	24343	36028	20263	24962	53112	28358	30110
512	60696	22476	36653	61999	23524	38380	64313	26922	39942	91435	33196	47610
1024	96413	26050	50580	99742	27468	53927	105871	32215	57063	143041	36292	67112
2048	136607	28300	62443	143388	29981	67625	156403	35728	72629	199277	38067	84397
4096	172581	29577	70738	183546	31418	77463	205430	37788	84101	248033	39022	96872
8192	198751	30260	75771	213435	32190	83539	243611	38910	91312	282605	39517	104603
16384	215056	30613	78566	232352	32590	86949	268569	39496	95401	303775	39769	108951

As WDFW identified in its September 2018 letter, improvements to the current monitoring program are needed to meet the NMFS population monitoring guidance (Crawford and Rumsey 2011) and will be needed to determine population level responses to restoration in lieu of fish passage at Merwin. For example, the Utilities indicated in 2017 that the current methodology to estimate coho salmon spawners based on redd surveys is likely biased. The bias is likely due to not meeting the assumptions required for unbiased redd surveys and the current estimates do not account for uncertainty in redd life and observer efficiency (Johnson et al. 2007, Gallagher et al. 2007, Gallagher et al. 2010, Murdoch et al. 2018). It is essential that the fish monitoring estimates are unbiased with an acceptable level of precision (Crawford and Rumsey 2011, Skalski et al. 2012). Monitoring improvements are needed for other species and life stages as well.

Process

From WDFW's perspective, ACC approval of restoration and monitoring plans preliminary determination, as required by the Service's in the 2019 In Lieu Letter, should occur before they are included in the non-capacity license amendments submitted to FERC approval. Should the amendments be approved by FERC, the plans become final and would be incorporated into the licenses. Thus, any future changes would require amendments to the plans and the accompanying regulatory process. The Utilities should either work with the ACC to gain approval of the plans before submitting the applications or the plans should not be included with the amendment applications.

On August 1, 2019, the Utilities provided the ACC preliminary draft plans for a 30-day review. WDFW provided some comments on August 29, 2019. WDFW requests that all correspondence be included in full as part of the ACC / TCC Comment Attachment for the plans. In addition, WDFW requests that the ACC correspondence and written communication regarding development of the in lieu decision and plans be included as consultation materials submitted to FERC for the draft non-capacity license amendment applications. WDFW also believes the comments submitted by parties to the Settlement Agreement should be appended as consultation materials to the non-capacity license amendment applications submitted to FERC. This would provide FERC with a full and broad view of the consultation process and comments from multiple stakeholders on the draft non-capacity amendments.

WDFW has provided constructive comments and recommended solutions consistent with meeting the reach and population scale fish response monitoring identified in the In Lieu letter. WDFW hopes the Utilities will continue to work collaboratively with WDFW, NMFS, and the ACC members to review and finalize the Lewis River Implementation Monitoring Plan.

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4. Bull Trout Comments

On April 12, 2019, the United States Fish and Wildlife Service (USFWS) Regional Director provided the Utilities with written notification (USFWS In Lieu Letter) of their deferral and adoption of NMFS' determinations regarding salmon and steelhead passage through the Utilities' Projects. USFWS also directed the Utilities to proceed with development of fish passage for bull trout pursuant to the section 4.10 of the Settlement Agreement. Specifically, USFWS directed PacifiCorp to implement a Yale downstream bull trout passage facility in the forebay of the Yale Reservoir Dam, implement a Swift upstream bull trout passage facility in the upper end of Yale reservoir near the base of Swift Dams and implement a Yale upstream passage facility at the upper end of Merwin reservoir near the base of Yale Dam. Comments provided herein address the *Draft Lewis River Bull Trout Passage Plan* (Bull Trout Passage Plan), an appendix of *Volume II – Exhibit E – Environmental Report* for the draft non-capacity amendment. The *Draft Lewis River Basin Implementation Monitoring Plan, Draft Lewis River Merwin In Lieu Program Strategic Plan* and *Environmental Report* reviews are provided separately.

WDFW has reviewed the Bull Trout Passage Plan utilizing the requirements identified in the Federal Power Act (FPA), applicable implementing regulations, the USFWS In Lieu Letter, and the 2004 Settlement Agreement. Additionally, WDFW reviewed technical comments provided to the ACC by the Lewis River Bull Trout Recovery Team, and offers the following comments:

The Bull Trout Fish Passage Plan proposes the development and installation of three fish passage facilities:

- Yale Downstream Bull Trout Passage Facility
- Swift Upstream Bull Trout Passage Facility
- Yale Upstream Bull Trout Passage Facility

Connectivity

WDFW is concerned that the Bull Trout Passage plan does not provide complete passive volitional connectivity from the upper Lewis Basin to the Columbia River. Connectivity is listed as a primary demographic threat to the Lewis River bull trout population in the USFWS Coastal Recovery Unit

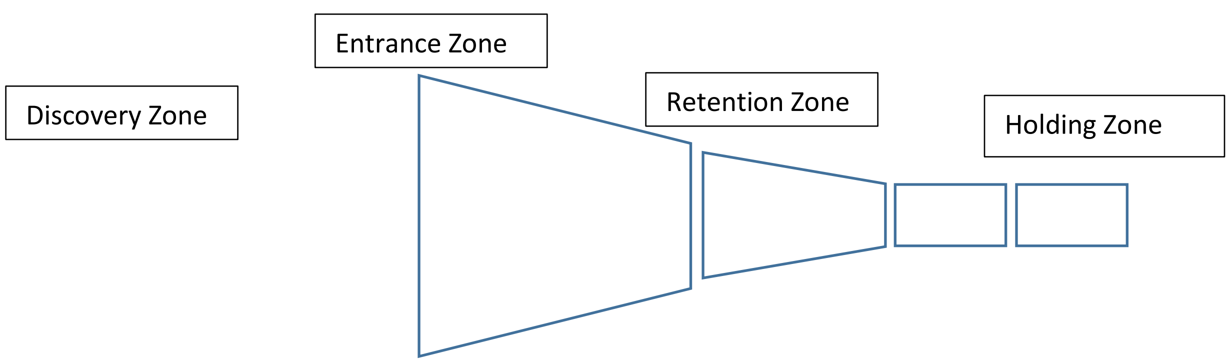
Implementation Plan for bull trout (USFWS 2015). WDFW is concerned with the deferral of a decision by the USFWS on whether to require construction of the Merwin Reservoir Downstream Bull Trout Passage Facility (recognizing the decision is not formally due until 2025) and thus, that the Bull Trout Passage Plan does not provide plans for complete connectivity from the upper Lewis Basin to the Columbia River. Specifically, the proposed plan excludes fish that currently reside in Merwin Reservoir and relies on trap and haul of bull trout from Swift and Yale Reservoirs which may or may not be actively moving downstream from the upper to the lower basin. This plan does not propose any downstream passage or mitigation for Merwin Reservoir.

Passage facilities
WDFW does not have major concerns with the preferred alternatives that the Utilities has proposed for the upstream adult collection methods; however, the proposed downstream Merwin-style trap for the Yale forebay needs further consideration. Additionally, the Bull Trout Passage Plan does not address current downstream passage collection efficiencies for bull trout at the Swift Floating Surface Collector (FSC) that might be negatively impacting downstream bull trout passage from populations above Swift Dam. The 2004 Settlement Agreement states in section 4.1.6, that PacifiCorp shall design and construct downstream fish passage facilities to achieve the following standards for each species (i) a Capture Efficiency (CE) of equal to or greater than 95% and (ii) a Capture Survival (CS) of equal to or greater than 99.5% for smolts and 98% for fry, and (iii) adult bull trout survival of equal to or greater than 99.5%. While these Capture Efficiencies are established for anadromous fish, this same standard should apply to bull trout collection. Ideally, this system would provide bull trout the opportunity to express the full complement of bull trout migratory strategies and life histories (i.e., anadromous, fluvial and adfluvial).

Inconsistent or sparse bull trout capture data during recent operations of the existing FSC shows that this collector is inefficient at capturing and possibly retaining sub adult and adult bull trout. Current efficiency testing and radio telemetry studies (conducted by PacifiCorp contractors) of out-migrating steelhead smolts and the number of adult steelhead kelts shows that larger fish can avoid or escape capture. Steelhead, being energetic swimmers and large in size, can serve as proxy for predicting capture and retention efficiencies for downstream migrating subadult and adult bull trout. A downstream passage report presented to the ACC in September 2019 (PacifiCorp, 2019) showed that the prior to the July 2019 FSC shutdown, the collection of adult steelhead kelts was only 54 of 1,013 adult steelhead transported above swift Reservoir. Based on other trapping data, there could be an expectation that up to 80% of transported steelhead will migrate downstream as kelts and be available to be captured for downstream transport (Thomas Buehrens WDFW, pers comm). Current smolt sampling protocols at the Swift FSC include subsampling during periods of peak migration, which may not accurately account for all juvenile bull trout that may be of similar size as out-migrating steelhead smolts if their abundance is low and/or sub-sampling rates are inadequate to detect them. Without accounting for these fish, the actual number of bull trout that have been transported to the lower Lewis is unknown. WDFW recommends the Bull Trout Passage Plan include a discussion of improvements that can be made to the FSC to increase bull trout collection and accounting.

The Utilities have expressed the infeasibility of passive volitional passage due to monetary constraints posed in section 4.10 of the Settlement Agreement or engineering constraints due to the scale of these high head dams. However, there currently is a similar project being constructed at Cle Elum Dam (U.S. Department of the Interior Bureau of Reclamation, 2010) with the goal of reconnecting isolated populations of bull trout (both upstream and downstream). WDFW suggests that PacifiCorp review this project for new engineering ideas that may be relevant to the perceived engineering constraints on the Lewis River.

The current Bull Trout Passage Plan does not provide for realistic collection of subadult/adult bull trout that are attempting to move downstream through the projects. There is a lot of uncertainty whether a floating Merwin-style trap will collect any fish, large or small, without attraction flow. In 1996 and 1997, two (2) Merwin style traps were installed and monitored above Cowlitz Falls Dam in Lake Scanewa. These traps had no pumping incorporated to induce attraction flows, and fish were able to volitionally enter and exit the traps. Based on mark-recapture methodologies, trap efficiencies were estimated to be approximately 20% (John Serl WDFW, pers comm). Unlike the proposed Yale Reservoir location, the Cowlitz facility was located in a constrained area of the reservoir and discharge flows during operation varied up to 10,000 cubic feet per second (cfs). This provided natural attraction flow; however, deployment and operation of these facilities was problematic for staff from an operational and safety standpoint. Poor trap/retention efficiency resulted in this trapping method being abandoned. Since then, Tacoma Power has installed and operated a fixed collector utilizing pumps to induce variable attractive and retentive flows. Similar to the approach PacifiCorp is working to implement with the FSC, successful floating surface collectors rely on induced flows and velocities to attract and retain fish utilizing pumps, screens and associated infrastructure to create 4 discrete zones, as shown below:



The Discovery Zone (sometimes referred to as the ‘Zone of Influence’ or ZOI) is a zone outside of the trap structure that is influenced by the pumping system installed in the trap. Discovery zone velocities are typically low and are intended to attract fish seeking downstream migration routes (typically < 1 cfs). Fish seeking a downstream migration route are attracted to the trap in the discovery zone.

Flows in the Retention zone (typically 6 – 10 cfs) should be sufficiently high and maintained as such to retain fish in the holding zone once they enter it, by prohibiting fish from exiting. Hence, the target species and life stages will dictate the required entrance flows and water velocity in the retention zone, which should be greater than the swimming abilities of these fish. Reduced velocities along the edges of screen faces (and not only averaged trap opening cross-sectional velocities) should be considered as escape routes for fish, with flows and collection areas adjusted accordingly to the swimming abilities of the targeted fish species. WDFW recommends that plans for the Yale downstream passage facility be updated to incorporate basic design elements and attraction flows as described above.

Two relatively successful operations where capture efficiency is high for sockeye and spring Chinook juveniles include: Cushman Dam, NF Skokomish and Baker Lake Hydro Project, Baker Lake. Both traps incorporate variable speed pumps to induce appropriate attraction and fish retention flows. These traps are equipped with pumps that provide from 250-500 cfs of attraction and retention flow (Pad Smith WDFW, pers comm). On the Baker lake project, installed pumps allow an increase of entrance flow up to 1,000 cfs to enable evaluation of fish collection performance. Along with the FSC, these projects can serve as examples for the Yale Forebay trapping design.

Monitoring & Evaluation and Adaptive Management
The current Bull Trout Fish Passage Plan does not include or discuss the need for monitoring and evaluation nor provide a clear plan for adaptive management. WDFW strongly recommends that the Bull Trout Passage Plan specify a robust monitoring and evaluation plan to evaluate design, operations and effectiveness for all proposed upstream and downstream installations as stated in Section 4.10 and Section 9 of the Settlement Agreement. Identifying when bull trout collection occurs (e.g., May – October) and decisions on how and where to transport fish should be an adaptively managed process between the Utilities and the ACC. The current plan also does not specify contingencies or specify strategies in case these assessments identify issues or shortcomings of the proposed approach. WDFW recommends an adaptive management approach be included as part of the proposed plan. Evaluating the effectiveness of the proposed facilities will allow the ACC representatives and their respective agencies/organizations to understand how well the Utilities are addressing the connectivity threat outlined by the USFWS (USFWS 2015), which is of primary concern in trying to move the Lewis River bull trout population towards recovery and delisting.

Process
The USFWS In Lieu Letter includes numerous references to the need for engagement and consultation with the ACC (including the USFWS) for design and protocol development, culminating in approval by the USFWS of any final designs. WDFW believes the current draft non-capacity amendment application review process implemented by the Utilities has not allowed for sufficient, meaningful engagement with the ACC in coordination with the USFWS to consult and review designs ultimately culminating in approval by the USFWS. Should the amendments be approved by FERC, the plans become final and would be incorporated into the licenses. Thus, any future changes would require amendments to the plans and the accompanying regulatory process. The Bull Trout Passage Plan should either be finalized and approved by the USFWS in consultation with the ACC before submitting the applications or not be included with the amendment applications.

On August 1, 2019, the Utilities provided the ACC preliminary draft plans for a 30-day review. WDFW provided some comments on August 29, 2019. WDFW requests that all correspondence be included in full as part of the ACC / TCC Comment Attachment for the plans. In addition, WDFW requests that the ACC correspondence and written communication regarding development of the in lieu decision and plans be included as consultation materials submitted to FERC for the draft non-capacity license amendment applications. WDFW also believes the comments submitted by parties to the Settlement Agreement should be appended as consultation materials to the non-capacity license amendment applications submitted to FERC. This would provide FERC with a full and broad view of the consultation process and comments from multiple stakeholders on the draft non-capacity amendments.

WDFW participates as a member of the Lewis River Bull Trout Recovery Team (LRBTRT), which is a team of technical representatives from federal and state agencies, utilities, and other non-governmental organizations that meet to discuss recovery actions for Lewis River bull trout and the most appropriate monitoring actions for the Lewis River bull trout populations. The LRBTRT recently conducted a review of the proposed Bull Trout Passage Plan. Comments compiled by the LRBTRT were submitted to the ACC for consideration during the non-capacity amendment application review period. WDFW's conclusions from review of the Bull Trout Passage Plan are similar to those of the LRBTRT. WDFW has attached a copy of the LRBTRT comment document for reference below.

WDFW hopes that the Utilities will continue to work collaboratively with WDFW, USFWS, and other ACC members to review and finalize bull trout passage designs, protocols, evaluations and decisions into the future.

References for Comments on Bull Trout:

PacifiCorp. 2019. Lewis River License Implementation Aquatic Coordination Committee Meeting notes, September 12, 2019. Retrieved from: https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/hydro/lewis-river/license-implementation/acc/9122019_ACC_MN.pdf

USFWS (US Fish and Wildlife Service). 2015. Coastal recovery unit implementation plan for bull trout (Salvelinus confluentus). USFWS, Portland, OR.

U.S. Department of the Interior Bureau of Reclamation. 2010. Cle Elum Dam Fish Passage Facilities and Fish Reintroduction Project. DOI, Yakima, WA.

Attachment to WDFW Bull Trout Comments: Lewis River Bull Trout Recovery Team Technical Review of the Lewis River Bull Trout Passage Plan provided to the Lewis River Aquatics Coordination Committee on April 8, 2020 (submitted by Jamie Lamperth, WDFW on behalf of LRBTRT)

Date: April 8, 2020

To: Lewis River Aquatics Coordination Committee, ACC

From: Lewis River Bull Trout Recovery Team, LRBTRT

Subject: Technical Review of the Lewis River Bull Trout Passage Plan

This document provides a technical review of the Lewis River Bull Trout Passage Plan by the Lewis River Bull Trout Recovery Team (LRBTRT).

The LRBTRT is concerned that this plan falls short of providing complete connectivity from the headwaters to the Columbia River. Ideally a bull trout passage plan would provide complete connectivity from the headwaters to the Columbia River via a passive, volitional passage system. This ideal system would provide bull trout the opportunity to express the full suite of migratory strategies (e.g., anadromous, fluvial, adfluvial) without human intervention (e.g. stress-induced physical transport).

Given that passive, volitional passage (e.g., fish ladders) is not an option for the Lewis River projects due engineering constraints (the height of the projects limit available options) and monetary constraints posed in Section 4.10 of the Settlement agreement, we do not have major concerns with the preferred alternatives PacifiCorp has put forth for the upstream passage solutions (the collection facilities in the Yale Tailrace and the Swift Bypass Reach). However, the downstream solutions need further consideration.

The plan does not provide for realistic collection of subadult/adult bull trout that are attempting to move downstream through the projects. Neither the Swift Floating Surface Collector nor the proposed Merwin-style trap for the Yale forebay are designed to collect adult fish. Further, there is a lot of uncertainty whether a Merwin-style trap will collect any fish, large or small, without attraction flow.

Regardless of the type of passage facilities put in place, the LRBTRT strongly recommends that the facilities should be monitored/evaluated for effectiveness via scientifically defensible methods as stated in Section 4.10 and Section 9 of the Settlement Agreement. Connectivity is listed as a primary threat to the Lewis River Bull Trout population (USFWS 2015). Evaluating the effectiveness of the facilities will allow us to understand how well we are managing the connectivity threat, and how well we are progressing towards delisting goals.

The LRBTRT strongly suggests that sampling protocols (sections V and VI of the Passage Plan), including when sampling occurs (e.g., May – October) and decisions on how and where to transport fish be an adaptively managed process between PacifiCorp and the LRBTRT. To that end, we suggest including a statement in the sampling protocol section of the plan that states, “PacifiCorp will continuously work with the Lewis River Bull Trout Recovery to adaptively manage passage decisions and protocols.”

References:

USFWS (US Fish and Wildlife Service). 2015. Coastal recovery unit implementation plan for bull trout (Salvelinus confluentus). USFWS, Portland, OR.

May 13, 2020

Kim McCune
PacifiCorp
825 NE Multnomah, Suite 1800
Portland, OR 97232

Sent via email

RE: Comments on Draft License Amendment Applications for FERC Project Nos. P-935, P-2071, P-2111 and P-2213

Dear Ms. McCune:

Trout Unlimited (TU) and American Rivers (AR) appreciate the opportunity to submit comments on the Draft License Amendment (DLA or Application) Applications for the Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects (FERC Nos. P-935, P-2071, P-2111 and P-2213) as submitted to the Lewis River Settlement Parties (Settlement Parties) on February 5, 2020 by PacifiCorp and Cowlitz PUD (collectively "Licensees"). TU and AR are both signatories to the Lewis River Hydroelectric Settlement (Settlement) and members of the Aquatics Coordination Committee (ACC). The following comments apply to all of the above-referenced applications.

PacifiCorp indicates that it is preparing the DLA in response to the preliminary "Fish Passage Determination at the Lewis River Hydroelectric Projects" issued by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) (collectively, the "Services") on April 12, 2019 pursuant to Section 4.1.9 of the Lewis River Hydroelectric Project Settlement Agreement. TU and AR believe there are serious legal and technical issues with the Services' preliminary decision and, along with several other Settlement Parties, agreed to engage in a dispute resolution process pursuant to Section 15.10 and 16.6 of the Settlement Agreement to address these deficiencies in good faith. Unfortunately, the Services have not afforded the disputing parties the same courtesy. To date, the Services (via a NMFS 2/7/2020 letter and a USFWS 2/14/2020 letter) have declined to consider additional information or address legal and technical issues raised by the disputing parties. This significantly decreases the prospect that a satisfactory outcome will materialize. TU and AR remain hopeful that the Services and Licensees will recognize that it is in their best interest to secure resolution of this issue in the dispute resolution process.

Given the current state of dispute discussions, it is premature for PacifiCorp to proceed with the DLA at this time. Additionally, it is contrary to the Services' direction. In its April 11, 2019 letter, NMFS explained that its preliminary determination would be finalized through "revisions to the [Settlement] Agreement and project license." Further, they state that NMFS would revise fishway prescriptions “[o]nce the Licensees have obtained necessary consent from the Agreement parties.” This has not occurred at this time. Accordingly, it is inappropriate for the Licensees to move forward with the DLA.

With the caveats that TU and AR continue to: 1) have significant concerns with the Services’ preliminary determination; 2) believe that implementation of the preliminary determination would be inconsistent with the Settlement and the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan (Recovery Plan); and 3) believe that the filing of the amendment application is premature, we offer comments on the DLA below.

1. The DLA is substantively and technically incomplete.

Generally, the amendment applications are substantively and technically incomplete, as they fail to include any of the comments directed to the Licensees and the Services by disputing parties through the dispute resolution process. Non-capacity amendments require consultation with resources agencies and Tribes to understand their concerns with the proposed amendment, identify “reasonable protection, mitigation, or enhancement measures to respond to impacts identified as being caused by the proposed amendment” and otherwise respond to recommendations/conditions submitted by the consulted parties. 18 C.F.R. section 4.38 (a)(7). Correspondence on such matters must be attached to the DLA. Id. There is a substantial number of dissenting documents in the record from agencies, Tribes and other disputing parties (including TU and AR) that have been submitted to the Licensees in the ACC and dispute resolution process that are not referenced in the DLA. These documents contain relevant information related to the concerns, supporting information and recommended measures from these parties. Without inclusion of these documents, the DLA is incomplete.

2. The In-Lieu Program Strategic Plan

The In-Lieu Program Strategic Plan is premised on the idea that significant habitat restoration can provide the same level of benefit to key aquatic species as the fish passage provisions in the Settlement. However, many of the assumptions and analyses underlying this plan call into question whether the benefits to species will actually accrue at the scale and within the timeframe needed to provide the required level of benefit. Additional information is needed to assure that benefits to fish will accrue in a timely manner and will be sustainable over the long-term. Additionally, to support informed decision-making and transparency, a more thorough analysis regarding the benefits that will accrue if the Settlement, including full fish passage, is implemented is warranted.

A. Habitat Assumptions

Much of the high-priority habitat targeted for rehabilitation and restoration occurs on United States Forest Service (USFS) lands. It is unclear whether USFS is willing to allow modifications to their lands for this purpose, or that the activities can be accomplished within USFS permitting guidelines. National Environmental Policy Act (NEPA) permitting can be time-consuming, and this must be built into permitting timeframes. Additionally, it is not clear that the long-term management objectives of USFS are structured to ensure that the benefits from habitat restoration will be fully realized. There also seems to be an assumption that USFS will be a significant source of logs for restoration activities. There is no formal indication that USFS has agreed to this. These considerations are all items that should be addressed in the application.

B. Timing Assumptions

In their 4/11/2019 letter NMFS proposes:

> "1) To remove [Settlement] Sections 4.6 and 4.7 in-lieu of habitat restoration funding, and 2) To defer a decision on Section 4.5 and 4.8 until 2031 and 4.8 to 2035 (respectively). This would ensure that in-lieu habitat restoration funding used in lieu of fish passage facilities in Lake Merwin perform as proposed, within set timelines."

This timeframe is unrealistic to evaluate the success of in-lieu measures. The letter calls for before and after (BACI) monitoring which requires years for permitting; pre-treatment surveys; habitat manipulation installation; multiple generations of fish utilization; and post-restoration surveys. It will take years to collect enough data to make an evaluation. An adequate BACI analysis (7 -11 years) cannot be conducted during the proposed timeframe. It will take years to install habitat improvements, years for fish to respond, and years to collect enough data to make an evaluation. Accordingly, the proposed timeframe is unrealistic.

We do not agree with eliminating passage and delay of implementation until 2031. This will disrupt the established Lower Columbia Fish Recovery Board recovery process. There is an independent timeline in the lower Columbia for endangered species recovery. The Lewis Basin is a major component of the overall recovery plan for Spring Chinook. Delays in restoration in the Lewis Basin pose overall threats to restoration in the entire lower Columbia ecosystem.

In sum, accurate monitoring and scientific evaluation of the success of any in-lieu habitat work within the Lewis watershed cannot be completed in the proposed timeframe. We anticipate that any approved project would require a full scientific design with a treatment and a statistically verified response. We also note, PacifiCorp has been very reluctant to do any monitoring on "Aquatic Fund" projects in the past and has specifically banned others which does not lend confidence to their assertions that adequate monitoring would be achieved for the in-lieu projects.

C. Ecosystem Diagnosis Treatment (EDT) Analysis

Generally, the Application errs on the side of over-estimating the benefits of habitat restoration while under-estimating the benefits of full fish passage. This is mostly due to over-reliance and inappropriate use of the EDT analysis. For transparency and comparison purposes, the application must more fully assess the benefits of the full passage alternative including the long-term benefits of reintroducing salmon and steelhead throughout their contiguous native range in the Lewis River basin. This alternative is given only a cursory look. Additionally, it should provide additional information supporting conclusions that its restoration sites are appropriate. As described in more detail below, reliance on the EDT analysis to identify restoration sites produces questionable outcomes.

The Services' 4/11/2019 preliminary determination letter states:

NMFS' justification relies on fish abundance estimates produced by a revised PacifiCorp and NMFS Ecosystem Diagnostic Treatment (EDT) analysis.[10] Although the use of EDT for abundance estimates and management decisions is cautioned against (McElhany et al. (2010); Roni et al. (2018)), this modeling is currently the best available information for comparisons between the benefits of reintroduction/fish passage and in-lieu habitat restoration options for increasing salmon abundance. The revised EDT analysis offers adult fish abundance estimates under both scenarios, as well as the ability to adjust for estimated juvenile losses during outmigration due to collection efficiency of a fish collection/passage facility Table 1.

It clearly indicates using EDT analysis is cautioned against for abundance estimates, yet the Services used exactly that for their analysis. It is a mathematical model based on questionable inputs. We do not believe it is the best available data and disagree with its premise. While in-lieu restoration may lead to increases in fish abundance in Merwin, this is not the case in Yale Reservoir. We question the accuracy and methodology of the EDT technique. Full passage provides superior benefits for fish in Yale. Restoration provides limited benefit for fish in Yale, while reintroduction more than doubles the coho and steelhead abundance. Chinook production is also increased in Yale versus restoration.

We do not believe that the four tributaries (Clearwater, Clear, Drift Creeks and the N. F. Lewis) identified for restoration efforts should be deemed appropriate solely on the basis of high EDT scores. These basins have negative temperature, chemical and access issues that should also be considered. In addition, other streams (Little Ck., etc.) that have superior temperature regimes, should be considered more thoroughly yet are ignored in the DLA. Moreover, potential negative effects of salmon restoration on other native species (bull trout, whitefish, other native trout etc.) within those reaches have not been adequately considered. This is particularly critical for listed bull trout.

D. The Underlying Analysis Justifying an "In Lieu" Plan is Flawed and the Process Used Has been Mischaracterized

Contrary to the implication in the Application, TU and AR do not agree that the Licensees engaged in a collaborative effort with the Settlement Agreement parties to evaluate "new information" to determine whether the fish passage provisions in the Settlement Agreement were appropriate. In fact, the Licensees initiated, funded and directed the effort to find a rationale to abandon contiguous fish passage through the Lewis River basin. The Settlement parties were left with little recourse other than to object to the course of action, provide technical input on the Licensees' actions and, ultimately, engage in the dispute resolution process outlined in the Settlement.

The Application does not remedy the fact that neither the Services nor the Licensees have provided sufficient information supporting a finding that fish passage is inappropriate.

Settlement Agreement section 4.9.1a states:

"New Information relevant to reintroduction and fish passage into Yale Lake or Lake Merwin may be available to the Services that may influence the implementation of fish passage into and out of these reservoirs, or that could result in the Services determining that reintroduction or fish passage for anadromous fish is inappropriate."

Settlement Agreement 4.9.1 c states:

"For purposes of this section, "New Information" is defined as information relevant to anadromous fish reintroduction and fish passage, including that presented by any Party, and provided to the Services and the Licensees. The Licensees must provide copies of such New Information to all the members of the ACC. This information may include, but is not limited to:

(1) Experience with upstream fish collection and transport facilities at other sites, including Merwin Dam.

(2) Experience with downstream fish collection facilities at other sites, including Swift No. 1 Dam.

(3) Experience with the reintroduction efforts of spring Chinook, coho, and steelhead above Swift No. 1 Dam.

(4) Consideration of broader contextual information beyond the Lewis River Basin, including regional anadromous fish recovery efforts."

It is clear that the Licensees are (and have not been) interested in evaluating all new information; focusing instead on information that they generated. Criticisms of their information has received minimal consideration. To that point, regarding criteria 1 (above), new technologies have come on board which show promise in upstream fish passage. They were not reviewed. The WHOOSHH (fish cannon) system is proving itself at mainstem Columbia River dams. Fish are passed through a flexible hose pipe pneumatically. The manufacturer (WHOOSHH) claims to be 80% less expensive than conventional fish ladders. These innovative methods were not referenced at all within the New Information analysis. Their use should be explored. No other means of collection or other sites were referenced.

Regarding criterion 2 & 3, since spring 2019, there has been a vast improvement in downstream collection at Swift dam due to reducing the depth (increasing the floor height) of the collection channel. Collection efficiencies of all fish species have increased dramatically. This is not reflected in the New Information analysis. Swift operations are showing increased efficiencies. The fact that Swift collections are improving serves to strengthen the argument that passage at Merwin and Yale is appropriate.

Regarding criteria (4), with the proper design and effort fish can be collected efficiently, as seen in existing dams (see Table 3.4-1 below; Baker, North Fork, River Mill). The Swift Dam collection has the lowest efficiency of all seven dams (11.8%), even though it was designed based on the Baker River gulper. Baker collections average 92% for coho and 87% for sockeye. In 2019 and 2020, the Swift downstream collector has shown a dramatic increase in collection efficiency not reflected in the Licensees' or Services' analysis. Collection at Swift can and should be improved. Collection at Yale or Merwin should not be dismissed merely because of poor past collection efficiencies at Swift, which are now steadily improving.

Table 3.4-1. Estimated juvenile collection efficiency of surface collector systems reported by the USGS. Data are preliminary with a final report due in 2017.

	Species			
Location	**Chinook**	**Coho**	**Sockeye**	**Steelhead**
Upper Baker		92.5%	86.3%	
Lower Baker		92.1%	87.3%	
Cushman		32.9%		
Swift Dam	0%	11.8%		18.6%
North Fork	87.3%	94.5%		95.5%
River Mill	98.3%	98.9%		96.9%
Round Butte	62%			39%
Cougar	<1%			
Average	**50%**	**70.5%**	**86.8%**	**62.5%**

LEWIS RIVER HYDROELECTRIC PROJECT Fish Passage Decision Support Document Prepared for the Lewis River Science Work Group PDSA Consulting, Inc. 10705 NE 42nd Place Kirkland, WA 98033 and Mason, Bruce & Girard, Inc. 707 SW Washington Street, Suite 1300 Portland, OR 97205. July 28, 2017.

Instead of meaningfully considering all available information, the Licensees and Services rely on an analysis that presumably supports the premise that habitat restoration can provide the same benefits to aquatic species as fish passage. However, the habitat restoration analysis has faulty assumptions. It assumes: restoration benefits accrue instantly (not true); that historic conditions can be replicated (not true - especially in the lower basin); that a 300 year old growth forest can be replaced immediately; that template conditions can be achieved for only $500,000/mile (not true for the lower portion of the basin) and that restoration can substitute for providing initial fish access.

Conversely, the benefits of reintroduction through fish passage would be <u>immediately realized</u> as the USGS found that Lake Merwin tributary habitats would support the spawning and juvenile rearing of coho salmon (Al-Chokhachy 2018; NMFS 4/11/2019 letter). Full passage also allows for fish to be sorted, parsed and prioritized; it allows for volitional passage; provides for system resiliency; and provides relief for fish moving downstream through turbines and spill events. Even without fish passage in place, there are currently Swift origin ESA juveniles present in Yale and Merwin Reservoirs.

The benefits of fish passage have been dismissed however due to a course “costs” assessment. Importantly, “costs” are not specified as a consideration in the New Information criteria outlined in the Settlement. The NMFS letter (4/11/2019) contains a whole section devoted to the cost comparison of passage versus the in-lieu restoration cost. Specifically, the letter states:

> “NMFS's decision is consistent with the intent of the Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West by removing arguably unnecessary burdens from PacifiCorp and giving them the opportunity to demonstrate their preferred approach is viable by demonstrating that the estimated benefits to the fish

populations can be realized before making a costly investment that would in turn be passed on to their rate-payers in the Columbia River Basin."

This is a non-issue and is not referenced within the New Information criteria. It does not belong in the Services' letters. Cost should not be considered in evaluating whether it is warranted to deviate from the terms of an agreed-upon settlement agreement against the interests of many of its signatories.

E. Additional Focal Species Should be Considered

The documents and discussion concerning fish passage at the dams involves primarily salmon species. There has been little discussion or effort directed toward trout or other native non-game species. Bull trout, because they are listed as "threatened" on the Endangered Species List, merit a full discussion. Rainbow, and cutthroat trout are not mentioned, nor are kokanee, whitefish, suckers, dace, sculpin or stickleback. Anadromous reintroduction will have positive or negative effects on all these species. Only Spring Chinook, coho and winter steelhead have been evaluated under the in-lieu new information. Information and analysis regarding other species' needs must be evaluated and included in the Application.

F. Recommendation

If the existing in-lieu recommendation is accepted by FERC, TU and AR recommend a complete amendment/revision of the Lewis River license and Section 18 of the Federal Power Plan. The USFWS stated in their letter:

> "With regard to the proposal by NMFS to delay a decision under Section 4.1.9 for the passage facilities at the Yale Reservoir, we recognize that the Agreement, the FERC licenses, and our prescriptions under Section 18 of the FPA do not provide for that kind of change to the schedule. We therefore recognize that <u>in order to implement the NMFS's proposal to delay a decision on passage at Yale Reservoir, it will require (1) discussion among the parties to the Settlement Agreement, including potential dispute resolution; (2) a request to amend the FERC licenses; and (3) amendment of the USFWS's Section 18 prescriptions."</u>

We support the USFWS position regarding delay on Yale by <u>canvassing the entire ACC</u> for their approval. Currently, all parties other than the Licensees are in favor of full passage. We anticipate the Settlement and the licenses and Section 18 prescriptions will need to be amended by FERC. Additionally, we support a robust adaptive management program with defined triggers for alternative actions (including reinstatement of fish passage) if habitat restoration does not work.

3. Monitoring Plan

TU and AR have a number of concerns with the monitoring plan including the adequacy of the proposed methodologies to demonstrate that the restoration treatments are producing the anticipated benefits. Additionally, we are concerned that the ACC cannot design, approve and implement (as called for in the Services letter) such a monitoring plan in a timely manner, and monitoring will not reach needed conclusions prior to the 2031 deadline. Our specific comments on the Plan are discussed in more detail below.

The NMFS noted that monitoring at a minimum, will require:

- Aquatic Coordinating Committee (ACC) approval of all restoration and monitoring plans.
- Restoration and monitoring activities will take place in tributary habitats above Swift Reservoir. Monitoring activities will be statistically based with sufficient power to determine the independent fish population benefits accrued from implementation of the in-lieu habitat program.
- Before/ After Control/Impact (BACI) or similar statistical design for the before-after monitoring program must be used.
- Restoration activities shall address at a maximum 3 of the limiting factors identified by the EDT analysis, for a reach chosen to be restored, and monitored.
- Merwin in-lieu habitat restoration monies be should focused on stream reaches above Swift reservoir that benefit all three species, to maximize restoration benefit. There is a maximum of 92.5km of habitat that falls into this category. Further, restoration efforts should focus on stream reaches that are known to support all three species since reintroduction efforts began in 2012, and are unlikely to be affected by future natural and anthropogenic causes.

We also believe population level monitoring is necessary to determine if fish populations have in fact achieved the predicted EDT responses.

A. <u>Specific Concerns with the Monitoring Plan</u>

We are concerned about the ability to provide both sufficient treatment and control sites within the sub-watersheds in the basin. This is required to prove the treatment has worked and has in fact caused an increase in fish abundance beyond that associated with fish passage.

We are surprised that NOAA Fisheries in the Services letter did not used the standard monitoring techniques, which they specifically call for evaluating within the Columbia basin. Previously, NMFS has directed that the analysis should also include evaluation of reduced and deferred gains in Viable Salmonid Population (VSP) parameters (abundance, productivity, spatial distribution, and diversity). These must evaluate gain or loss from delaying both reintroduction and in-lieu actions.

Given the importance of Lewis River populations to the broader Lower Columbia recovery scenario, the focus should include evaluation of impacts at the population, strata and Evolutionarily Significant Unit (ESU) scales. This should include an analysis regarding the impact of Lewis River species on other populations in the larger basin.

The monitoring plan proposes snorkel surveys in late summer and winter/spring. A series of snorkels will be necessary (testing for observer efficiency) over the whole year as fish move and migrate at different times. This is particularly the case for Spring Chinook in the Lewis, as they migrate throughout the year. There is also questions over the testing methodology, as the Licensees' plan calls for using *t*-tests. Such tests may be adequate to determine a change in relative abundance, but will not document achieved abundance goals.

Additionally, we question the prioritization of streams that contain three salmon species; this does not necessarily make them the best choice for restoration. The prioritization process fails to consider negative effects on listed bull trout or other native fish species, as salmon-oriented restoration projects are evaluated. Improving habitat for coho and Chinook juveniles may place native trout, especially listed bull trout, under increased predation and competition - violating the ESA. This must be adequately evaluated in the Application.

B. <u>Monitoring Data Used in the "New Information" Analysis</u>

We have concerns with how the monitoring data provided in the "New Information" to the ACC was interpreted. Nonvalid conclusions particularly regarding predation level were advanced by the Licensees that are contradicted by the data. Mark Sorel was the primary investigator for the New Information. He was subcontracted by PacifiCorp through the USGS. His data was presented in his master's thesis and in two Trans. Am. Fish. Soc. research articles. These documents were committee certified and peer reviewed. He stated, ". . . Merwin Reservoir would function as a migration corridor without imposing undue predation mortality, . . . Our findings suggest that predation should not preclude the feasibility of reintroducing anadromous salmonids." There is no specific data or any relevant referenced citations within the New Information stating anadromous fish passage is inappropriate.

Initially, Sorel's work was not provided to the ACC. Subsequently, a second report was developed by the USGS, specifically for PacifiCorp. It had no peer review and was provided to the ACC and Services. But, discrepancies within this report and previously known information from the Seral et al. documents caused the USGS to issue a second version of their report attempting to clarify and removing contentious assertions made in the initial draft document.

The credibility of the conclusions in the final released document are questionable. As an example, the final draft states, "There is a high predation potential for all seasons, but particularly during summer/ spring." The actual Sorel stomach analysis data shows no kokanee present in Spring and comprise only 14% of pikeminnow diet during summer.

Additionally, the Licensees presented work from Mason, Bruce & Girard, Inc. stating: "[b]ased on an analysis of stomach contents of different age classes, salmonids are a primary prey fish for Lake Merwin Northern Pikeminnows with fork lengths (FL) greater than or equal to 300mm (11.8 inches)." The initial Sorel et al data indicated pikeminnow ≤ 300 mm eat more crayfish, other smaller pikeminnow, and sculpin than salmonids. During Fall at peak predation levels, kokanee only constitute 28% of large pikeminnow diet. The USGS and Mason Bruce and Girard used the data collected by Sorel et al., and put their own interpretation on it to highlight the Licensees' perspective. Their interpretations are at odds with the original data.

There were also some absurd assumptions made in the final New Information analysis: Pikeminnow would shift all diet choices to migrating smolts; smolts would be present year-round in Merwin; and 0 age spring Chinook would be the primary prey target for pikeminnow. Sorel's original predation levels were amplified over 40 times, with no explanation. And finally, there was no discussion of management actions to reduce predation (seining, fish traps etc.), as if predation reduction is impossible. It is manageable with concerted effort.

These discrepancies cannot be explained, unless data was deliberately chosen to complement preexisting incorrect suppositions to bolster the case of for no passage. In reality, predation is a modest, anticipated and manageable element of the reintroduction plan outlined in the Settlement. Predation can be mitigated and overcome, if desired. Predation within Swift Reservoir was not addressed in the management plan.

C. Conclusions and Recommendation

Prior experiences with the Licensees and their interpretation of monitoring results does not lend confidence that this monitoring plan will be designed and implemented, or its results analyzed, in a scientifically robust manner. ACC approval of restoration and monitoring plans is necessary; and based on the previous New Information analysis provided by the Licensees monitoring must be thoroughly vetted. ACC approval will likely be difficult to obtain. The comments of other Settlement parties regarding monitoring must be reviewed and addressed.

Aside from the Licensees and the Services, there is little support for the current situation. The 4/12/2019 USFWS letter correctly points out, "At the conclusion of the ACC review process in 2017, <u>technical representatives for all parties, except PacifiCorp and Cowlitz PUD, continued to express support for completion of required fish passage within the Yale system, and uncertainty regarding Merwin fish passage."</u> As of today, this has not changed. Many of the Settlement signatories including the Cowlitz tribe, Trout Unlimited, American Rivers, the Native Fish Society, Lower Columbia Fish Recovery Board, U. S. Forest Service and Washington Dept. Fish and Wildlife have all filed alternate dispute resolutions. The current in-lieu plan is only supported by the Licensees, who have a definite financial interest in the path forward. Local representatives of the Services have been unable to defend the in-lieu decision. This has not been a fair and impartial process.

If targets and goals for any affected species cannot be achieved under the Services decision within the established recovery period, then we believe it is incumbent upon NMFS to identify different approaches for achieving recovery plan expectations. These should include shifting threat reduction and productivity improvement efforts to other impact categories in the overall lower Columbia Recovery Plan, including implementation of existing fish passage obligations in the Settlement Agreement.

4. Bull Trout Passage Plan

Given that bull trout are listed as "threatened" under the ESA, the Licensees and Services must take extra care to ensure that populations in the Lewis basin are maintained and/or increased. Unfortunately, the needs of the bull trout have been overlooked in favor of other priority reintroduction species. For instance, since 2005, adult coho have been placed into the basin to spawn naturally in competition with bull trout. Bull trout have been largely ignored and relegated to a minor role in Yale fish passage. The Bull Trout Passage Plan does not do enough to reverse this.

We have several concerns with the Bull Trout Passage Plan. The scaled-down plan does not provide equivalent benefits to anadromous, adfluvial, and fluvial life history strategies historically displayed by bull trout populations throughout their range, and specifically within the Lewis Basin. Historical and anecdotal evidence exists for fluvial or anadromous bull trout presence, below Merwin Dam and in the vicinity of Woodland.

In the Coastal Recovery Unit Implementation Plan for Bull Trout (*Salvelinus confluentus*) September 2015, prepared by U.S. Fish and Wildlife Service Washington Fish and Wildlife Office Lacey, Washington and Oregon Fish and Wildlife Office Portland, Oregon; Primary Demographic Threats are listed:

Connectivity Impairment Fish Passage Issues

> "2.1.1 Provide adequate upstream and downstream passage. The three dams on the mainstem Lewis River reduce connectivity in the North Fork Lewis basin by preventing upstream passage of adult bull trout and downstream passage of juvenile, bull trout. Lack of connectivity reduces the potential for genetic interchange between the bull trout populations in the North Fork Lewis basin. Lack of passage between the upper and lower portions of the basin inhibits the opportunity of the expression of an anadromous life history strategy. Within the next 15 years, provide upstream and downstream passage as described in the Lewis River Settlement Agreement (PacifiCorp et al. 2004)."

The Recovery Plan calls for full passage. It did not recommend in-lieu measures.

Currently, the Settlement states, "Unless otherwise directed by USFWS, bull trout collected in the Swift Downstream Facility shall be transported to Yale Lake, except that bull trout with a smolt-like appearance, as determined by PacifiCorp (using methods devised in Consultation with the ACC), shall be transported to a location determined by USFWS below Merwin Dam." This does not seem to be the case at present.

Settlement, Section 4.10 requires bull trout passage in the absence of anadromous fish facilities.

> "If, pursuant to Section 4.1.9, PacifiCorp does not build the Yale Downstream Facility described in Section 4.5, then PacifiCorp, on or before the 13th anniversary of the Issuance of the New License for the Yale Project, shall construct and provide for the operation of a downstream bull trout collection and transport facility in the Yale forebay (the "Yale Downstream Bull Trout Facility"). If, pursuant to Section 4.1.9, PacifiCorp does not build the Merwin Downstream Facility described in Section 4.6, then when USFWS determines that bull trout populations have increased sufficiently in Lake Merwin, but not sooner than the 17th anniversary of the Issuance of the New License for the Merwin Project, PacifiCorp shall construct and provide for the operation of a passage facility similar to the Yale

Downstream Bull Trout Facility at Merwin Dam (the "Merwin Downstream Bull Trout Facility")."

PacifiCorp currently has <u>not</u> met the Yale completion date.

USFWS also points out "Determine Need for Merwin Downstream Bull Trout Passage Facility" is required by 2025. "This decision would be based on a determination that bull trout have increased sufficiently in number in Lake Merwin to warrant construction of this facility in the Merwin forebay." It is unclear where will these fish come from if no passage is provided.

"PacifiCorp shall provide for monitoring of performance as provided in Section 9, and make necessary and appropriate Facility Adjustments and Facility Modifications to the Yale and Merwin Downstream Bull Trout Facilities, in Consultation with the ACC and with approval of USFWS, to achieve relevant performance standards as provided in Section 4.1.4." We believe the Settlement requires the best and most efficient collector possible within the Yale forebay. In conjunction with the USFWS and the Lewis River bull trout recovery team (LRBTRT); TU, as an ACC member, anticipated being included in the design and planning of the actual collector and offered the opportunity to provide input into its operation. <u>This has not been the case</u>.

PacifiCorp consultants presented their initial designs to the ACC on 8/8/19. There was no opportunity to propose any ideas, only an opportunity to comment on R_2 consultant's proposed plans. We anticipate little more than a bare bones Merwin type floating trap as proposed by USFWS and PacifiCorp. We are still awaiting this collaboration. To date, it has not occurred. Specifically, the lack of attraction flow proposed for use in the Yale forebay trap virtually assures that bull trout seeking a downstream pathway will be denied. If the chosen Merwin type plan is used; some measure to provide attraction flow (pumps, etc.) will be required for success.

USFWS has yet to describe or defend why they recommended a Merwin like fish collector in the Yale forebay. They have tied themselves to an outdated ineffective passage design without any justification for said design. This is in spite of their 2015 Recovery Plan citing that lack of continuity in the basin is a major limiting factor for bull trout within the Lewis Basin. Currently USFWS is failing to re-establish continuity between reservoirs in the Lewis basin, and the proposed amendments will not do so either. If USFWS is unable to complete their role in safeguarding bull trout perseverance due to shortages in staff, funds or time, they should acknowledge this and leave the process or turn it over to WDFW as the bull trout management agency.

Settlement section 4.10.2 states:

"Yale and Swift Upstream Bull Trout Facilities. If (1) pursuant to Section 4.1.9, the Licensees do not build the Swift Upstream Facility, and (2) USFWS determines on or before the 13th anniversary of the Issuance of the New License for the Swift No. 1 Project or the Swift No. 2 Project, whichever is later, that collect-and-haul methods established under Section 4.9.1 or 4.9.2 are not meeting bull trout performance standards provided in Section 4.1.4, then on or before the 17th anniversary of the Issuance of the New License for the Swift No. 1 Project or the Swift No. 2 Project, whichever is later, the Licensees shall complete construction of and provide for the operation of alternate passage facilities (the "Swift Upstream Bull Trout Facility")."

This upstream facility appears to have more potential than the Yale downstream or Yale upstream facilities. If pursuant to Section 4.1.9 (1), PacifiCorp does not build the Yale Upstream Facility, and (2) USFWS determines on or before the 17th anniversary of the Issuance of the New License for the Yale Project that collect-and-haul methods established under Section 4.9.1 or 4.9.2 are not meeting bull trout performance standards provided in Section 4.1.4, then on or before the 17th anniversary of the Issuance of the New License for the Yale Project PacifiCorp shall complete construction of and provide for the operation of alternate passage facilities (the "Yale Upstream Bull Trout Facility"). It is unlikely the Licensees will meet this timeline.

The Licensees in their in-lieu program strategic plan correctly pointed out, "[f]or Yale, while there is habitat available for SPCH, coho and steelhead, we have grave concern regarding the negative impacts to Yale bull trout. The Yale population is genetically distinct and per the USFWS Recovery Plan, must be protected." This is imperative in the face of unanticipated threats to the Yale bull trout population. Coho fry were unexpectedly encountered during bull trout electrofishing surveys of Cougar Creek in 2016. They were likely from an unknown number of coho adults spilled from Swift Reservoir during a December 2015 high water event. Over 300 coho were captured averaging 48 mm fork length. Coho to bull trout fry densities within Cougar Creek were observed to be 5 to 1. Coho can easily overwhelm and out compete YOY bull trout at this stage. Coho fry were also observed within Constructed Channel and Ole Creek, tributaries to the Swift Bypass Reach." (PacifiCorp, 2015)

Swift origin salmonids (coho, Chinook and rainbow) have already made their way downstream, and have been identified in Merwin Reservoir. This verifies they are reaching other reservoirs via spill or turbine transit; this puts existing populations in jeopardy. Only full fish passage will allow coho and other salmonid smolts to exit Yale Reservoir and avoid competing with bull trout for food and spawning access.

Any salmon entry into Yale puts the Cougar Creek bull trout population at risk. This is a very small population (25- 40 adult fish). If salmon or steelhead are placed into Yale, an outlet or full collection process must be implemented. Also, Cougar Creek, the only bull trout spawning stream in the Yale system, must be protected from spawning salmon and steelhead. A 100% tight fish trap is necessary to protect bull trout spawning areas by removing salmon and steelhead adults.

The Licensees should exhibit the same concern for bull trout in Swift Reservoir as they appear to in Yale. Large numbers of coho, steelhead and spring Chinook adults have been placed into Swift to spawn naturally. They produce large numbers of unnumbered juveniles. Coho adults superimpose redds over bull trout redds, and steelhead kelts residing in Swift prey on bull trout sub-adults. PacifiCorp committed to studying interactions between bull trout and reintroduced salmonids, but this has been minimal. Requested diet studies have not occurred. Stomach analysis of adult steelhead or chinook coho and steelhead parr also have not occurred. More is necessary.

The 2015 Implementation Plan for Bull Trout also cites action: 2.3. Small Population Size

> "2.3 Genetic and Demographic Stochasticity – Current low abundance levels limit the effective breeding population size, which adversely impacts population productivity through potential inbreeding and genetic drift.
>
> 2.3.1 Increase population size if less than demographic threshold. The suite of actions could include: translocation from populations inside or outside of the basin, a limited hatchery supplementation program, and translocation into unoccupied habitats within or outside the basin."

The Yale bull trout population consists of ≈ 30 – 40 adults. This low number puts them in jeopardy for inbreeding and reduced gene numbers. Full passage provides for interchange of genetic materials between Yale and Swift and also allows for the potential expression of anadromous bull trout behavior. Anecdotal records exist of anadromous bull trout present in the basin below Woodland prior to construction of Merwin Dam.

Finally, the Settlement Agreement section 4.2 contains the following requirement:

> 4.2.1 "Monitor and adaptively manage interactions between bull trout and reintroduced salmonids. Reintroduction of anadromous salmonids into the upper Lewis basin will result in interactions between bull trout and reintroduced salmonids that may have positive or negative outcomes. At this time, reintroduction success and results of the aforementioned interactions are unknown. Adaptively manage the reintroduction strategy to benefit all species."

This monitoring is not occurring. From 2016-2018, bull trout were not tagged examined or measured. No abundance estimates were generated and salmon – bull trout interactions (stomach analysis) did not occur. License amendments should not be enacted until these provisions of the Bull Trout Recovery Plan are included and formalized in the Licensees' Plan.

5. Conclusion

Native salmonids have thrived in the upper Lewis River since the last Ice Age and persisted through the eruption of Mount St. Helens in 1980. Now, they are threatened by a management decision designed to avoid key obligations in the Settlement Agreement in favor of an alternative based on questionable assumptions, incomplete analysis and disregard for the impacts to species other than salmon.

We remain deeply concerned about the process and analysis that has been utilized to push this alternative forward. The in-lieu decision is inconsistent with the Settlement Agreement, not based on the best available information, made without considering ACC input and appears to have been a political decision designed to permit the Licensees to avoid providing fish passage at the two lower Lewis River dams. It is unfortunate that the Licensees prefer this path to the collaborative governance structure that the Settlement Agreement anticipated would inform high-stakes management decisions.

To date, neither the Services nor the Licensees have been able to adequately explain or defend the decision to forego fish passage obligations in favor of an in-lieu alternative. As noted above, the ACC was not involved in developing the in-lieu alternative, yet the Licensees want the ACC to reengage to help push this unsupported license amendment process forward in a very short timeline. Frankly, there is not enough time to do an adequate job. The whole process has been carefully crafted to support a narrative that this represents a unified stakeholder outcome. It does not. We encourage the Licensees to reconsider (consistent with these comments) the process, product and timeline to ensure the pathway that emerges is based on the best available science, consistent with legal obligations and the Settlement and broadly supported by the ACC and other stakeholders. At present, the proposed plans still require ACC verification and acceptance. If changes are not made to the current course of action, this will not be easy to achieve.

Thank you for the opportunity to comment and we look forward to continued discussions on these very important topics.

Regards,

Jim Byrne
ACC Representative
Trout Unlimited

Chandra Ferrari
Senior Policy Advisor/Staff Attorney
Trout Unlimited

Wendy McDermott,
Director, Rivers of Puget Sound and Columbia Basin
American Rivers

References

Al-Chokhachy, R., Clark, C.L., Sorel, M.H., and Beauchamp, D.A., 2018, Development of new information to inform fish passage decisions at the Yale and Merwin hydro projects on the Lewis River, Washington—Final report, 2018: U.S. Geological Survey Open-File Report 2018–1190, 206 p., https://doi.org/10.3133/ofr20181190.

LEWIS RIVER HYDROELECTRIC PROJECT Fish Passage Decision Support Document Prepared for the Lewis River Science Work Group by PDSA Consulting, Inc. 10705 NE 42nd Place Kirkland, WA 98033 425-822-3549 and Mason, Bruce & Girard, Inc. 707 SW Washington Street, Suite 1300 Portland, OR 97205 July 28, 2017

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PacifiCorp, Lewis River Bull Trout Report., J. Doyle. 2015.

USF&WS. Coastal Recovery Unit Plan for Bull Trout (*Salvelinus confluentus*) September 2015, Prepared by U.S. Fish and Wildlife Service Washington Fish and Wildlife Office, Lacey, Washington and Oregon Fish and Wildlife Office, Portland, Oregon

NMFS Comments on DRAFT Applications for License Amendments 5/13/2020

General Comments

- NMFS has focused its efforts within this review on Exhibit E (Environmental Analysis), and Exhibit E Appendices (Merwin In-Lieu Program Strategic Plan [Strategic Plan] ; Lewis River Basin Implementation Monitoring Plan [Monitoring Plan]) found within each of the four Applications for License Amendment (Merwin, Yale, Swift 1, Swift 2) documents submitted for review.
  - Thank you for addressing our comments from the last opportunity to review the draft Strategic and Monitoring Plans, and where necessary incorporating additional information.
- Due to a lack of staff resources, NMFS has not provided comments on the Lewis River Bull Trout Passage Plan.

Volume II Environmental Report

- E.4.1.1 Fish Resources
  - No mention of pikeminnow or resident rainbow trout.
- E.4.1.1.2 Short Term Impacts to Fish
  - This is the first introduction of noise effects to fish, while turbidity effects were discussed in previous sections.
  - Are there in-water-work-window differences for tributaries and reservoirs? IWWW are established during times fish are least likely to be present and I doubt this is the same time for lentic and lotic systems.
  - Discussion of the delayed Yale decision for passage or habitat restoration falls into this section. Is ten years really a short term impact? I would define the difference between short-term and long-term impacts earlier in the document.
- E.4.2.1 Long-term Impacts to Historical and Archaeological Resources
  - Did the 2006 FEIS evaluate different passage scenarios, and in-lieu outcomes? Does the Merwin In-Lieu program perpetuate (as inferred) or alter the 2006 FEIS evaluation with respect to fish runs being managed by people?

Volume III Exhibit E Appendices

Strategic Plan

- 1.0 Introduction
  - The inclusion of all the steps and documents necessary for the services to reach a final determination should be included in that discussion. Including but not limited to; fish passage prescriptions, BiOp, and NEPA.
- 2.6 Project Ranking

    - Why are the Services the final decision makers with respect to projects that have even ranking? Is this a SA provision? Wouldn't it be better for the ACC to vote on projects that rank out evenly to break ties? Or via TAC recommendation?
- 3.2 RFP Process
    - I think it would be valuable to include a list of some potential contractors to implement in-lieu restoration projects. Currently we struggle to award aquatic fund monies, and I worry this process will have similar disappointing results.
- 3.4 Reporting and Milestones
    - With respect to dewatering and fish relocation, I'm quite sure a certified Fish Bio from the state will need to be present during these actions, and they cannot be solely undertaken by the contractor.
    - I'm hopeful that all annual reporting will be done on an individual project basis. At a minimum ensuring all reporting clearly define Utility funded projects and "matching" funded projects.

Monitoring Plan

- 1.0 Introduction
    - Again, include all the steps necessary for the preliminary decision to become final.
- 1.1 Habitat Restoration Goals and Monitoring Objectives
    - There are elements of the Strategic Plan ("matching funds" and project implementation in the lower river/Mainstem Columbia) that do not fit the overarching goal set forth in the SA that specifically states "above Merwin Dam". It would be highly beneficial within the Strategic Plan to clearly state why the PA will be seeking matching funds to spend in the lower river/Columbia when that doesn't sync with the Habitat Restoration Goals and Monitoring Objectives section of the Monitoring Plan, and are outside the Reintroduction Outcome Goal described in the SA.
- 1.2 Key Questions and Scale
    - In the last question of the section. It would be good to define which EDT run you will used to evaluation the restoration and habitat improvements.
- 1.3.2.2 BA Monitoring of Parr, Smolt, and Adult Salmon and Steelhead
    - Tables 6 and 7. Why is 2019 data omitted from the analysis and these tables?
- 1.3.2.4 Run EDT or Other Models
    - No models other than EDT are discussed in this section.
    - I agree that the high quality data inputs to the EDT model should be collected and used pre and post restoration, under this approach. I would also like to see how the high quality data inputs, compare with the original EDT runs using lower quality best professional judgement data, we relied on for the preliminary decision.
- 1.3.2.6 Recommended Population Monitoring Approach
    - Agreed that EDT re-runs and genetic mark recapture are the best combonation of approaches to detect potential changes in production potential in habitats above Swift reservoir. However, the FSC is vital to the collection of data for the genetic mark recaptures. How will changes in CE throughout the study affect the genetic mark recapture analysis, a random effect in the regression analysis?
- 1.4.5 Population Level Biological Monitoring

    - Subsection Genetic Sampling
        - I think it will be vital to know at a minimum the tributary Adults with genetic material collected are spawning in. This way it can be differentiated between tributary locations that are receiving habitat restoration treatments and those that are not. The results wouldn't be very convincing if only a few spawning pairs are significantly contributing to smolt production and we don't know where they originated from. It would be more compelling to see that tributaries receiving habitat restoration treatments are more successful than those not with respect to smolt production and successful breeders.
    - Subsection EDT Modeling Before and After Restoration
        - Also please report the variability in these refined estimates to the original EDT analysis used to inform the preliminary decision.
- 2.0 Data Management, Analysis and Reporting
    - Why is the TAC not included in the list of groups it will be important for the monitoring team to report annual progress to? I thought the TAC was involved in adaptive management?
- 3.2 Relation to Ongoing Monitoring
    - Table 12. The FSC is not operated year round as indicated in the Table. It shuts down seasonally and this should be noted within Table 12.

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File Code: 2170; 2520; 2600
Date: May 13, 2020

Todd Olson
Director of Compliance, Renewable Resources
PacifiCorp
825 NE Multnomah, Suite 1800
Portland, OR 97232

Dear Mr. Olson:

The Forest Service appreciates the opportunity to review and comment on the proposed *Draft Applications for Non-Capacity Amendments of Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects* (FERC Nos. P-935, P-2071, P-2111, and P-2213), and accompanying documents including the *Environmental Report*, the *Draft Lewis River Merwin In Lieu Program Strategic Plan*, the *Lewis River Basin Implementation Monitoring Plan* and the *Lewis River Bull Trout Passage Plan* (collectively, Amendment Documents). Although the Forest Service would prefer to see a continuation of the Alternative Dispute Resolution process including formal mediation as described in Section 15.10 of the Settlement Agreement prior to commenting on any Amendment Documents, we have nonetheless provided the comments summarized below with specific comments provided in the enclosed documents. Providing review comments on the Amendment Documents should not be construed as support from the Forest Service for the regulatory agencies' interim determinations or the Amendment Documents that are listed above. The Forest Service would prefer to see the licensees working collaboratively with the Aquatic Coordination Committee to resolve the issues summarized below:

- Further discussion is required between the licensees and the Forest Service to ensure NEPA and permitting processes satisfy Forest Service requirements for restoration projects proposed on National Forest System lands (*Draft Lewis River Merwin In Lieu Program Strategic Plan*).
- We have concerns that the plans accompanying the proposed Amendment will not produce the information that the regulatory agencies need to make their final fish passage determinations within the 10-year timeframe described in the agencies' preliminary fish passage determinations. Pristine (i.e. template) conditions, as assumed by the Ecosystem Diagnosis and Treatment (EDT) modeling, cannot be restored within target stream reaches in the ten-year time frame. Therefore, the monitoring effort will not yield the critical information required to evaluate restoration success. Likewise, we have concerns that the monitoring plan will not statistically differentiate any fish population response from In Lieu restoration relative to other variants within the 10-year duration required by the regulatory agencies' preliminary fish passage determinations (*Draft Lewis River Merwin In Lieu Program Strategic Plan and Lewis River Basin Implementation Monitoring Plan*).

- We will leave the review of the Bull Trout fish passage design review to the agencies with experts on Bull Trout fish passage facilities. However, we recommend that the final design of the Bull Trout passage facility not preclude construction of anadromous fish upstream passage facilities in the future (*Lewis River Bull Trout Passage Plan*).

In summary, the Forest Service supports efforts to continue with formal mediation as part of the Alternative Dispute Resolution proceedings to review the regulatory agencies' interim determinations prior to the utilities initiating any license amendment proceedings. However, as noted above, if the proposed license amendments are to move forward, the Forest Service recommends that all members of the Aquatic Coordination Committee continue to work collaboratively to develop an amendment that meets the goals of the Settlement Agreement.

Sincerely,

TOM TORRES
Acting Forest Supervisor

Enclosure: Amendment Documents with Comments (1)

cc: Kimberly.McCune@PacifiCorp.com ; Kimberly Bose, FERC; Settlement Agreement participants, consultation parties and Aquatic Coordination Committee Members; Forest Services: Dave Olson, Diane Hopster, Joshua D. Jones, Douglas Young, Mailroom Gifford Pinchot

USDA United States Department of Agriculture Forest Service Gifford Pinchot National Forest

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File Code: 2170; 2520; 2600
Date: May 13, 2020

Gary Huhta
General Manager
Public Utility District No. 1 of Cowlitz County
961 12th Avenue
Longview, WA 98632

Dear Mr. Huhta:

The Forest Service appreciates the opportunity to review and comment on the proposed *Draft Applications for Non-Capacity Amendments of Merwin, Yale, Swift No. 1 and Swift No. 2 Hydroelectric Projects* (FERC Nos. P-935, P-2071, P-2111, and P-2213), and accompanying documents including the *Environmental Report*, the *Draft Lewis River Merwin In Lieu Program Strategic Plan*, the *Lewis River Basin Implementation Monitoring Plan* and the *Lewis River Bull Trout Passage Plan* (collectively, Amendment Documents). Although the Forest Service would prefer to see a continuation of the Alternative Dispute Resolution process including formal mediation as described in Section 15.10 of the Settlement Agreement prior to commenting on any Amendment Documents, we have nonetheless provided the comments summarized below with specific comments provided in the enclosed documents. Providing review comments on the Amendment Documents should not be construed as support from the Forest Service for the regulatory agencies' interim determinations or the Amendment Documents that are listed above. The Forest Service would prefer to see the licensees working collaboratively with the Aquatic Coordination Committee to resolve the issues summarized below:

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Sincerely,

TOM TORRES
Acting Forest Supervisor

Enclosure: Amendment Documents with Comments (1)

cc: Kimberly.McCune@PacifiCorp.com ;Kimberly Bose, FERC; Settlement Agreement participants, consultation parties and Aquatic Coordination Committee Members; Forest Service; Dave Olson, Diane Hopster, Joshua D. Jones, Douglas Young, Mailroom Gifford Pinchot

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

May 13, 2020

DELIVERED ELECTRONICALLY

Mark A. Sturtevant, Vice President
c/o Kim McCune
PacifiCorp
825 NE Multnomah, Ste. 1800
Portland, OR 97232
Kimberly.McCune@PacifiCorp.com

RE: Comments on Draft License Amendment Applications for Merwin, Yale, Swift No. 1, and Swift No. 2 Hydroelectric Facilities Under 18 C.F.R. § 4.38(a)(7) (FERC Project Nos. P-935, P-2071, P-2111, and P-2213).

Dear Mr. Sturtevant,

I write on behalf of the Confederated Tribes and Bands of the Yakama Nation ("Yakama Nation") to record the following comments of concern regarding the Draft License Amendment Applications for the Merwin, Yale, Swift No. 1, and Swift No. 2 hydroelectric facilities (collectively "Facilities"), Federal Energy Regulatory Commission ("FERC") Project Nos. P-935, P-2071, P-2111, and P-2213, issued to the 2004 Lewis River Settlement Agreement ("SA") parties by PacificCorp and Cowlitz County Public Utility District No. 1 (collectively "Utilities" or "Applicants") on February 5, 2020. Under 18 C.F.R. § 4.38(a)(7), this letter preserves, incorporates, and reasserts the concerns of and opposition to the proposed license amendments for delayed or eliminated fish passage implementation at the Facilities.

I. SUMMARY

Yakama Nation objects to PacifiCorp's and Cowlitz PUD No. 1's (together, "Utilities'") assertion that the proposed license amendments will provide for adequate mitigation for injured Endangered Species Act ("ESA")-listed salmon and steelhead populations in the Lewis River basin. The ongoing delay in implementation and proposed elimination of contiguous fish passage through the basin as described in the SA, and subsequently in the 2008 renewal for the Facilities licenses, is unacceptable and cannot be reconciled with the 2004 SA. Specifically, Yakama Nation opposes, without limitation, the license amendment applications for the following reasons:

- Continued delays in implementation and elimination of fish passage throughout the Lewis River basin constitutes material harm to ESA-listed salmon and steelhead populations, and by extension, Yakama Nation's inherent and reserved right to pursue its cultural, subsistence, ceremonial, and economic fishing activities in the Columbia River fishery;
- The SA procedures for informal dispute resolution were invoked in 2019 by multiple parties, including Yakama Nation as a participant, and the disputed In-Lieu Proposal has not been resolved yet either through the resolution process or by amendment to the SA;
- The NMFS and US Fish & Wildlife Service (collectively the "Services") have not finalized their "preliminary determination" on the proposed In-Lieu plan for "appropriate" elements as required under the SA's prescribe process;
- The In-Lieu Proposal fails to sufficiently demonstrate that the threshold of 22.5km of "template" condition stream habitat can actually be restored to achieve its theoretical mitigation targets; and,
- The proposed monitoring plan fails to demonstrate that it will be able to validate the effectiveness of proposed In-Lieu habitat restoration projects in actually achieving targeted population-level benefits in-lieu of the current SA requirement for fish passage which compounds Yakama Nation's concern that the In-Lieu Proposal erodes mitigation standards for the Utilities' Facilities.

II. BACKGROUND

The 1885 Treaty between the United States and the Yakamas ("Treaty") reserved to the Yakamas fishing rights on the Columbia River and its tributaries, including "the right of taking fish at all usual and accustomed places . . . ."[1] A federal treaty is considered the supreme Law of the Land under the U.S. Constitution.[2] Yakama Nation is a Co-Manager of the Columbia River fishery pursuant to its status as a sovereign Native Nation, authority within the Treaty, and recognition by federal courts.[3] Yakama Nation's Treaty Territory encompasses usual and accustomed fishing sites from the mouth of the Columbia River upstream to beyond the 49th parallel.

In 2004, Yakama Nation along with all other SA parties, including the Utilities, agreed that fish reintroduction and passage throughout all hydro facilities was an underpinning of the SA. Reintroduction and passage are exemplified in the SA Joint Explanatory Statement ("JES") section 3.2.

In 2010, the Lower Columbia Fish Recovery Board ("LCFRB") described a vision, strategy, and actions for the recovery of ESA listed salmon, steelhead and trout species.[4]

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[1] *See* Treaty with the Yakamas, U.S. – Yakama Nation, June 9, 1855, 12 Stat. 951, art. III, cl. 2.
[2] *See* U.S. Const. art. VI, cl. 2.
[3] *See United States v. Washington*, 384 F. Supp. 312, 382 (W.D. Wash. 1974), *aff'd*, 520 F.2d 676 (9th Cir. 1975); *see also U.S. v. State of Oregon*, 666 F.Supp. 1461 (D. Or. 1987).
[4] LCFRB, WASHINGTON LOWER COLUMBIA SALMON RECOVERY AND FISH AND WILDLIFE SUB-BASIN PLAN – K NORTH FORK LEWIS RIVER SUB-BASIN (2010).

The lack of fish passage to the upper Lewis River basin was designated as the primary cause of decline in all ESA listed species, and is also considered the primary limiting factor in ESA listed species recovery within the Lewis River recovery plan, amongst other interdependent limiting factors.

The 2013, the National Marine Fisheries Service ("NMFS") Recovery Plan for Lower Columbia River Coho salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead (June 2013) specified the lack of passage on the North Fork Lewis as an impediment to recovery.[5] Later in 2015, the NMFS Status Update reiterated that spring Chinook salmon, coho salmon and winter steelhead would benefit from additional passage.[6]

In all instances, recovery plans, and the most recent status reviews point to fish passage in the Lewis River as necessary for successful recovery of salmon, steelhead, and bull trout.

III. THE DRAFT LICENSE AMENDMENT APPLICATIONS ARE INCONSISTENT WITH THE 2004 SA

Yakama Nation requests, under 18 C.F.R. § 4.38(c)(i)(6)(i), the that the Utilities hold a joint meeting within 60 days of submission of these comments between the SA parties to continue the on-going SA prescribed procedures for dispute resolution reach an equitable agreement on the proposed plans for environmental protection, mitigation, or enhancement measures between the SA parties. Yakama Nation has relied on the SA's prescribed terms to advocate for restoration of the Lewis River fishery. The next critical phase under the SA dispute resolution terms requires the Services to finalize their "preliminary determination" regarding future proposed amendments to the existing SA Lewis River fish habitat restoration plan. The Utilities Draft License Amendment Applications are premature and serve to restrict Yakama Nation's participation under the 2004 SA.

The Services' decisions have not been finalized, and as noted in the Utilities' February 5, 2020 cover letter to SA parties, seeking to amend Facility licenses "[s]ubject to the Services' final determination . . . ." The NMFS explained in its April 11, 2019 letter that determinations would be finalized through "revisions to the [Settlement] Agreement and project license." Additionally, the NMFS stated that it intends revise fishway prescriptions "[o]nce the Licensees have obtained necessary consent from the Agreement parties." This further underscores that the Utilities must complete the SA procedures for dispute resolution prior to submission of the Draft License Amendment. It is improper for the Utilities' to attempt to implement the In-Lieu Proposal, contrary to the 2004 SA, while the SA parties dispute the In-Lieu Proposal and the Services preliminary determinations are not finalized.

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[5] NMFS, ESA RECOVERY PLAN FOR LOWER COLUMBIA RIVER COHO SALMON, LOWER COLUMBIA RIVER CHINOOK SALMON, COLUMBIA RIVER CHUM SALMON, AND LOWER COLUMBIA RIVER STEELHEAD 18 – 25 (2013).

[6] NMFS, STATUS REVIEW UPDATE FOR PACIFIC SALMON AND STEELHEAD LISTED UNDER THE ENDANGERED SPECIES ACT: PACIFIC NORTHWEST (2015).

Under SA section 4.1.9, new information, i.e. the In-Lieu Proposal, must meet the bar of rendering universally agreed fish passage at the Facilities as "inappropriate," – overruling the consensus opinion of SA parties in 2004 that fish passage was central to their support of the Commission's issuance of a 50-year operating license. Yakama Nation relied on the Utilities' commitment to the importance of fish passage at the Facilities in reaching agreement in the 2004 SA. The Services did not determine that Facility fish passage was inappropriate in their "preliminary determinations", dated April 11 and 12, 2019. The Draft License Amendment Applications are incomplete without procedural resolution under the SA and an opportunity for the SA parties to engage with the Services' final determination.

IV. THE IN-LIEU PROPOSAL FAILS TO IMPLEMENT SUFFICIENT HABITAT MITIGATION

i. The In-Lieu Proposal's Target of 22.5km in "Template" Condition Stream Habitat Restoration is Exaggerates Achievable Mitigation.

The fish population abundance numbers used by the Utilities to support abandoning fish passage are based on the restoration projects' ability to instantaneously restore 22.5km of stream habitat to "template" or historic conditions; this is an impossible task. In the upper Lewis River basin, where these projects are tentatively proposed, template conditions would require rolling back the effects of the 1980 eruption of Mt. St. Helens and instantly growing 300-year old forests on the riverbanks, as a start. Template-condition instream requires the presence of old-growth riparian forest that has since been lost to the collective impacts of over a century of volcanism, intensive forest management, mining, logging, recreation, stream clearing, and the upstream impacts of the hydropower projects.

The Utilities' suggestion that the In-Lieu Proposal can restore the habitat function of a pristine ecosystem through general project types and locations, such as adding large wood to streams and attempting to reconnect off-channel and floodplain habitats, exaggerates an actual mitigation that could be achieved to reduce the importance of implementing full fish passage. Setting aside the impossible objective of instantly restoring template conditions in the treatment reaches in the upper Lewis River basin, the In-Lieu Proposal fails to adequately explain how the Utilities would ensure that the fund outcomes would be tied directly to the Facilities impacts for which mitigation is required. Eliminating passage to the Merwin Reservoir unacceptably reduces the spatial diversity of salmon and steelhead populations. Even if the Utilities' proposed habitat improvements improve habitat quality, they cannot increase spatial diversity or other population attributes impacted by forgoing fish passage to Merwin Reservoir and its tributaries.

The Draft License Amendment Applications fail to provide adequate information demonstrating that in-lieu habitat work is sufficient replacement for full fish passage. The In-Lieu Proposal also failed to evaluate the in-lieu strategy against full passage which restores the spatial diversity, abundance, productivity, and builds resiliency into these populations into the future. In the case of Merwin Reservoir, passage would presumably be permanently abandoned, making impacts to salmon, steelhead, and their beneficiaries permanent. In the case of Yale Reservoir and tributaries, an additional ten (10) year delay for evaluation and monitoring is equally unacceptable.

The Draft License Amendment Application obscure a fundamental truth: fish passage as agreed in the 2004 SA remains the most beneficial action that could be undertaken within the basin for salmon and steelhead. Full fish passage therefore remains *appropriate* and should be implemented as soon as practicable given the Commission's previously granted, unmitigated extensions.

ii. The Proposed Monitoring Plan is Insufficient to Validate The Effectiveness of Proposed In-Lieu Habitat Restoration.

The proposed Monitoring Plan does not attempt to address population-level effects of habitat restoration. The proposed "implementation and effectiveness monitoring of restoration actions at the project and reach scale" is inadequate to evaluate population-level effects of habitat restoration. Eliminating full fish passage without developing a methodology to robustly validate the modeled population-level increase in fish abundance directly attributable to in-lieu habitat restoration actions means that any future determination regarding "appropriate" or "inappropriate" mitigation lacks a foundational basis against the current 2004 SA Facility passage requirements. The proposal for a ten (10) year delay in fish passage implementation during a monitoring period, which fails to monitor any actual population-level benefits from habitat restoration in relation to the benefits expected from providing fish passage is disingenuous under the SA.

V. CONCLUSION

Yakama Nation opposes the Draft License Amendment Application, specifically the In-Lieu Proposal and continued fish passage implementation delays prior to the completion of the 2004 SA dispute resolution process and the Services' final determination. Additionally, the In-Lieu Proposal, as presented, will not benefit the Lewis River fishery and sufficiently advance the recovery of ESA-listed salmon and steelhead when compared to the existing SA requirement for full fish passage. No other SA parties are in agreement with the Utilities' stated preference to provide habitat restoration funding in lieu of fish passage to Merwin and Yale Reservoirs – these Draft License Amendment Applications frustrate the SA procedural process for dispute resolution and the cooperative commitment made by the SA parties in 2004. For further comments or questions please contact the Yakama Nation Fisheries Resources Program Manager, Paul Ward, (509) 949-4129 or by electronic mail at warp@yakamafish-nsn.gov .

Respectfully,

PHILIP RIGDON, DNR SUPERINTENDENT
YAKAMA NATION

McCune, Kimberly

From:	Romanski, Tim <tim_romanski@fws.gov>
Sent:	Thursday, May 14, 2020 9:16 AM
To:	Olson, Todd
Cc:	McCune, Kimberly; Thompson, Brad; Schoessler, Michael A; White, Rollie; Wilson, Frank S
Subject:	[INTERNET] FWS Comments on PacifiCorp License Amendments
Categories:	[INTERNET]

Mr. Olson

Thank you for the opportunity to review your pre-submittal draft license amendments for four hydroelectric projects on the Lewis River. Please share our comments with all Settlement Party and Aquatic Coordination Committee members.

PacifiCorp and Cowlitz Public Utility District (Utilities) are sharing these license amendments with the Settlement Agreement parties in advance of submitting the license amendments to the Federal Energy Regulatory Commission (FERC) in June 2020. PacifiCorp has stated previously that they would use these early comments from all settlement parties to revise the license amendments prior to submitting the draft license amendments to FERC for approval. The Fish and Wildlife Service supports this approach and looks forward to working with the Utilities and the settlement parties to incorporate as many of their comments as possible into the draft license amendments before submitting to FERC. The comments below are our preliminary comments and the Service reserves the right to amend and/or submit additional comments to FERC when the license amendments are noticed to the public.

Based on letters from the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service that were issued in April 2019, the Utilities are proposing not to construct anadromous fish passage facilities in Merwin Reservoir, thus triggering the in lieu fund provision of the Settlement Agreement, and delaying the construction of anadromous salmon passage in Yale Reservoir for up to 14 years. In lieu funds would be used to construct and monitor restoration projects in the upper Lewis River and its tributaries above Swift Reservoir. The evaluation of the effectiveness of restoration projects to increase the capacity and overall numbers of juvenile salmon in the upper Lewis River will be used by NMFS to determine the need to construct anadromous salmon passage in the Yale Reservoir. In its April 2019 letter, the Fish and Wildlife Service informed PacifiCorp that, per Section 4.10 of the Settlement Agreement, the construction and operation of bull trout passage facilities would be triggered at both Merwin and Yale Reservoirs and the Utilities should plan to implement Section 4.10.

Bull Trout Passage

The Fish and Wildlife Service sees the purpose of Section 4.10 of the Settlement Agreement as providing bull trout in the Lewis River system the opportunity to express the full range of their life history strategies and provide connectivity between populations absent full salmon passage facilities in Yale and Merwin Reservoirs. The mainstem Columbia River provides productive foraging habitats for migratory bull trout and critical connectivity among core areas for potential gene flow and population refounding. It is anticipated that the mainstem Columbia River will have increasing importance as key foraging and overwintering habitat for fluvial bull trout as passage improvements are made at hydroelectric facilities currently isolating individual core areas (such as the Lewis River projects) and as the status of bull trout populations improve. In addition, if the anadromous life history can still be expressed within some core areas of the Lower Columbia River region including the Lewis River, the Columbia River will also provide a critical connection to marine habitats (USFWS 2015).

In order to achieve these recovery plan goals, all bull trout collection facilities, including the existing Swift Floating Surface Collector (FSC), have to be efficient and effective at collecting and transporting all life stages of bull trout that could possibly encounter one or more of these facilities. In addition, there must be established, but flexible, protocols that clearly identify sampling/tagging instructions and final disposition of each individual fish encountered at each collection location. The Fish and Wildlife Service currently believes that such a protocol would likely utilize the collective experience at the Aquatic Coordination Committee (ACC) and the Lower Columbia River Bull Trout Recovery Team (LRBTRT) to help develop the protocol that would eventually need to be approved by the Fish and Wildlife Service.

Section 4.10 identifies four general locations where bull trout collection facilities would need to be constructed in the absence of salmon passage facilities per Section 4.1.9 of the Settlement Agreement. Section 4.10.2 prescribes Yale and Swift upstream facilities that are not intended to be passage facilities of the same magnitude and expense as the Yale and Swift Upstream Facilities described in Sections 4.7 and 4.8. Section 4.10.1 prescribes the Yale and Merwin Bull Trout Facilities shall be similar in magnitude and scale to a modular floating Merwin-type collector and are not intended to be passage facilities of the same magnitude and magnitude and expense as the Yale and Merwin Downstream Facilities described in Sections 4.5 and 4.6.

The current license amendments proposed by the Utilities includes three of the four facilities, recognizing that the Merwin Downstream Facility requires a positive population finding by the Fish and Wildlife Service that can occur no sooner than 2025. All facilities also need to follow the provisions of 4.1.1 through 4.1.3 during the design phase; 4.1.4 for Yale Downstream Facility to achieve relative performance standards; and the Swift and Yale Upstream facilities must be monitored per Section 9 and the Fish and Wildlife Service can require any necessary facilities adjustments and modifications under Section 4.1.6 of the Settlement Agreement.

Because the scale and magnitude of these collection facilities s less than what would have been required under full anadromous fish passage facilities, the effectiveness of these smaller (and, in some cases, passive) facilities has to be carefully investigated prior to construction and actively and adaptively managed post-construction. Currently, the draft license amendments lack a thorough alternatives analysis of the three facilities that are being proposed for construction. These facilities should also follow the same process that was used to design and construct the existing upstream facility at the base of Merwin Dam and the existing FSC in the forebay of Swift Reservoir. It would be helpful if PacifiCorp more fully described in the license amendments both (1) the consultation and design processes that it will carry out for each of the bull trout facilities prior to construction and (2) the monitoring and adaptive management procedures that it will carry out once the facilities are constructed.

Other Comments

In several locations in the documents, it is stated that the Fish and Wildlife Service deferred a decision on whether to require construction of the Merwin Downstream Bull Trout Passage Facility. To be clear, the Fish and Wildlife Service did not defer this decision. According to Section 4.10 of the Settlement Agreement, the decision to require a downstream bull trout passage facility can be made no sooner than the 17th anniversary of the issuance of a new license for Merwin--or 2025--and is to be based on the population status of bull trout in Merwin Reservoir. The license amendments should correctly reflect when and under what circumstances a downstream bull trout collection facility would be constructed in the forebay of Merwin Reservoir.

The documents do not contain clear goals and objectives that would allow the Fish and Wildlife Service and NMFS to determine the need to require PacifiCorp to construct full anadromous fish passage facilities in Yale Reservoir at the conclusion of the implementation, monitoring, and evaluation of the In Lieu Restoration Plan. Without specific, clearly stated goals and objectives, it is unclear how and when the decision to construct full anadromous fish passage in Yale Reservoir will be made. We recommend such language be included in the license amendments submitted to FERC.

Cowlitz Indian Tribe
PO Box 2547 • Longview, WA 98632

Kim McCune
Via email: Kimberly.McCune@pacificorp.com

RE: Comments on Draft Non-Capacity License Amendment Applications, Lewis River Hydroelectric FERC Project Nos. P-935, P-2072, P-2111, and P-2213

May 13, 2020

Ms. McCune,

The Cowlitz Indian Tribe (Tribe) opposes the draft applications to the Federal Energy Regulatory Commission (Commission) for approval and issuance of non-capacity license amendments to the 2008 licenses for the above-referenced projects (Projects) owned and operated by Pacificorp and Cowlitz Public Utility District #1 (together, "Utilities"). The Tribe has reviewed the draft license amendment applications and provides these comments in its role as a party to the 2004 Settlement Agreement, member of the Lewis River Aquatic Coordination Committee (ACC), and consultation party under the Federal Power Act (18 C.F.R. § 4.38(a)(7)).

Below, the Tribe addresses specific flaws in the proposal concerning ecological and environmental analysis, lack of specifics and nexus to the Project site, and procedural defects. But there is also a more fundamental objection to the entire concept of these applications. The context here is a 50-year license to do grave and continuing harm to a whole ecological and environmental system that is critical to the Tribe's cultural and heritage interests. That grave harm was justified solely by a quid pro quo reflected in the 2004 Settlement Agreement requiring the Utilities to build specific fish passage facilities on a specific timetable. The 2008 Licenses are the product of that bargain and reflect the duty of the federal parties to protect the environment and uphold their federal trust responsibility to the Tribe.

Yet the draft license amendment application proposes to renege on that bargain. The Utilities have not met the deadlines they agreed to, even as extended, to begin work on fish passage facilities or justify an alternative, but they seek to be rewarded for their delay with further extensions that will deprive an entire generation of the Tribe of the benefits of the 2004 bargain. The Utilities concede the need to amend their licenses but deny the need to bargain to amend the Settlement Agreement, which contains essentially the same obligations as the licenses, to implement their proposed alternative. And the Utilities ignore Section 4.1.9 of the Settlement Agreement, which provides that before an In Lieu alternative can be implemented, there must be (i) a "final" decision of the National Marine Fisheries Service ("NMFS") and the US Fish and Wildlife Services ("USFWS," together with NMFS, "Services"), (ii) based on material "new information," that (iii) demonstrates that the agreed fish passage facilities are "inappropriate."

Instead, the Utilities rely on a preliminary determination by the Services that it would be "prudent" to substitute vague In Lieu measures that might provide "comparable" benefits to save the Utilities money. There is no "new information" in the amendment application supporting the conclusion that the agreed fish passage measures are "inappropriate." The "new information" that has been provided fails to show that environmental conditions have significantly changed since FERC's grant of the license. Instead, the preliminary determination is just a new economic and political decision to substitute an inferior, cheaper environmental solution based on a different cost-benefit analysis — a different set of policy priorities — than the parties agreed to in 2004 and FERC adopted, after a comprehensive analysis, balancing environmental and economic interests, in 2008. If Settlement Agreements under FERC's jurisdiction are to mean anything, they cannot be subject to one-sided, unilateral re-writing via a license amendment application in this manner.

The Tribe disagrees with the Utilities' conclusions that resource impacts of the proposed license amendments' measures will adequately mitigate damage done to Endangered Species Act ("ESA")-listed salmon and steelhead populations in the Lewis River basin due to ongoing delay and proposed elimination of contiguous fish passage through the basin as described in the Settlement Agreement and 2008 licenses. Specifically, the following conclusions, as interpreted from the Utilities' license amendment applications, are unsupported, unlawful, and unreasonable:

- Ongoing and proposed delays in instituting fish passage throughout the Lewis River basin do not cause material harm to ESA-listed salmon and steelhead populations, and by extension, the Cowlitz people, and therefore, no mitigation is needed.
- Short- and long-term impacts to ESA-listed populations are limited to those caused by in-lieu habitat restoration, and forgone benefits of fish passage (as agreed in the 2004 Settlement Agreement) do not warrant consideration.
- The Merwin In-Lieu Strategic Plan ("Strategic Plan") meets the threshold of 22.5 kilometers of stream habitat restored to "template" or pristine conditions as stipulated by the National Marine Fisheries Service ("NMFS") in its April 11, 2019 communication.
- In-lieu habitat restoration projects can instantaneously restore "template" or pristine conditions used to model adult salmon and steelhead abundance numbers in the proposed restoration treatment of the identified stream reaches with approaches identified in the Strategic Plan.
- A modest, hypothetically-modeled, delayed increase in the abundance of salmon and steelhead within the Lewis River basin is adequate mitigation for a loss in overall viable salmonid population (VSP) parameters for salmon and steelhead (i.e., population abundance, productivity, distribution, and diversity) that would have been realized by implementing contiguous fish passage through the Lewis River basin as agreed in the 2004 Settlement Agreement.
- The proposed monitoring plan can validate the effectiveness of in-lieu habitat restoration projects in meeting or exceeding the population-level benefits expected from fish passage as directed by the NMFS April 11, 2019 communication.

Therefore, pursuant to 18 C.F.R. § 4.38(c)(6)(i), the Tribe requests that the Utilities hold a joint meeting within 60 days of submission of these comments between the Utilities, the Tribe and other agencies with similar or related areas of interest, expertise, or responsibility to discuss and attempt to reach agreement on its plan for environmental protection, mitigation, or enhancement measures. The Tribe suggests, at a minimum, that agencies meeting this list of qualifications include the Confederated Tribes and Bands of the Yakama Nation, Washington Department of Fish and Wildlife, USDA Forest Service ("Forest Service"), the Services, and Lower Columbia Fish Recovery Board.

This submission of the Tribe's comments on the content of the draft license amendment applications is not an exhaustive review of the Tribe's previously submitted comments, concerns, and communications on the fish passage throughout the Lewis River basin, which have spanned many years and involved materials beyond those included or referenced by the license amendment applications. Rather, the Tribe incorporates the entirety of those comments by reference and requests that they be considered by the Utilities in any deliberations on this matter. The Tribe has reviewed all four applications and understands that the information presented in all applications is substantially similar. Therefore, to simplify the format of these comments, when specific page numbers are identified they refer to the draft application for Project No. P-2111.

Required consultation documentation for license amendment application.

It is the Tribe's conclusion that the license amendment applications are incomplete and should be withdrawn. The draft license amendment application is also inconsistent with the Settlement Agreement and should not be submitted to FERC until such time as the necessary amendments to the Settlement Agreement have been negotiated and implemented in accordance with the terms of the Settlement Agreement. In the event that such amendments are successfully negotiated and executed by the parties to the Settlement Agreement, then the license amendment application may be revised and submitted to all Settlement Agreement parties for another 90-day review and comment period once they have been completed.

As described in 18 C.F.R. § 4.38(a)(7),

> "[t]he amendment as filed with the Commission must summarize the consultation with the resource agencies and Indian tribes on the proposed amendment, propose reasonable protection, mitigation, or enhancement measures to respond to impacts identified as being caused by the proposed amendment, and respond to any objections, recommendations, or conditions submitted by the agencies or Indian tribes. Copies of all written correspondence between the application, the agencies, and the tribes must be attached to the application."

The draft amendment applications do not currently contain the many communications, comments, and concerns previously provided to the Utilities and Services by the Tribe and other parties regarding protection, mitigation, or enhancement measures required to offset the impacts of the proposed license amendments. The Tribe and other Settlement Agreement and consultation parties have submitted substantive comments, expressed serious concerns, and ultimately pursued Alternative Dispute Resolution proceedings over the Utilities' attempts to abandon their fish passage obligations in the 2004 Settlement Agreement for the Lewis River basin. These disputes, comments, and issues raised by the Tribe and other Settlement Agreement and consultation parties have not been resolved and are not, as required, acknowledged in the draft license amendments. Without these comments or communications attached or faithfully summarized, many Settlement Agreement parties are being asked to objectively review the license amendment articles while being deprived of the information necessary to perform an adequately review and make informed comments.

Consultation to date on studies informing draft license amendment articles

The Utilities state in Volume 1, Page 8 that:

> "[b]eginning in November 2011, PacifiCorp and Public Utilities District No. 1 of Cowlitz County … began consultation with the members of the Lewis River Aquatic Coordination Committee (ACC) over the development of new information to submit to the Services for their determination if the additional fish passage facilities identified in the Agreement and in the Section 18 prescriptions were appropriate…"

In this and previous communications, the Utilities imply that November 2011 was the initiation date of a collaborative effort between the Utilities and the other Settlement Agreement parties active within the ACC to collectively abandon contiguous fish passage through the Lewis River basin. This implication is false. The Utilities initiated the effort to collect "new information" under their own funding, under their own direction, to their own benefit, and contrary to other Settlement Agreement parties' interests and stated concerns. In the ensuing years, the Tribe and others have strongly opposed the Utilities' efforts to abandon fish passage measures that are the centerpiece of the 2004 Settlement Agreement. The best available science shows the fish passage facilities and measures remain as appropriate today as the day the Settlement Agreement was signed. In fact, five other Settlement Agreement parties have joined the Tribe in disputing the Utilities' push to abandon fish passage, and additionally the Forest Service and Confederated Tribes and Bands of the Yakama Nation ("Yakama Nation") have expressed concern with the abandonment of the fish passage in communications with the Services and Utilities.

This statement also fundamentally attempts to reframe the phrasing of the Settlement Agreement, which, in Section 4.1.9, does not state that the Services evaluate new information to determine if fish passage is "appropriate." To the contrary, the new information must meet the bar set in the Settlement Agreement of rendering fish passage facilities "inappropriate," overruling the consensus opinion of Settlement Agreement parties in 2004 that fish passage was central to their support of the Commission's issuance of a new 50-year operating license This is a suitably high bar given the importance of fish passage facilities in reaching agreement in support of issuing licenses (e.g., the July 24, 2008 Pacific Power/Cowlitz PUD join press release, which boasts that "[t]he centerpiece to the new licenses is a staged plan to open up more than 170 miles of habitat currently blocked to migrating fish. This effort will contribute to the recovery of listed salmon and steelhead in the lower Columbia River"). The Director of the FERC Office of Energy Products specifically cited the importance of comprehensive fish passage to the Commission's decision to grant the licensees the longest available terms of 50 years for new licenses for the Lewis River projects, e.g., from paragraph 97 of the Background section of the Order Issuing New License for Project No. 935-053:

> "The license for the Merwin project requires extensive long-term environmental measures including construction of a modular surface collector and transport facilities for salmon and steelhead smolts at the Merwin Project, installation of upstream and downstream passage facilities for bull trout habitat enhancement measures, upgrades to Lewis River hatcheries, a comprehensive aquatic monitoring program, and new recreational facilities and improvements to existing facilities. The annualized capital costs for environmental measures for the Merwin Project are in excess of $10 million. Therefore, a term of 50 years is appropriate."

The Services also failed to clear this exceptionally high bar of rendering fish passage inappropriate in their "preliminary determinations" on fish passage on April 11 and 12, 2019. For example, NMFS' April 11 letter acknowledges that the Services' role under Section 4.1.9 of the Settlement Agreement is to determine "whether fish passage requirements have become 'inappropriate'." However, instead of the Services finding that fish passage dictated by the Settlement Agreement was inappropriate based on new information provided by the Utilities, the April 11 letter proposes what NMFS deems a "prudent path [to forgo passage to Merwin Reservoir], given the potential for comparable fish population benefits (between passage and habitat restoration) and the cost savings for the Licensee (as much as $85M)." By doing so, the Services made an economic cost/benefit finding and not a finding whether fish passage for the Lewis River basin was inappropriate. Said another way, even if the Services believe the In-Lieu funding is less costly, the Services had not made the required finding that the fish passage agreed to in the 2004 Settlement Agreement is inappropriate. There is simply no indication that the new information provided has indicated that the environmental conditions have significantly changed since the Commission's issuance of the license in a manner that would render the construction of the fish passage facilities "inappropriate."

Utilities' Contradictory Reliance on the Services' "preliminary determinations."

The Utilities' draft license amendment applications are based on the Services' April 11 and 12, 2019 preliminary determinations. Despite the fact that these decisions have not been finalized, and as noted in the Utilities' February 7, 2020 cover letter to Settlement Agreement parties, the Utilities seek to amend their licenses "[s]ubject to the Services' final determinations..." NMFS explained in their April 11, 2019 letter that their determinations would be finalized through "revisions to the [Settlement] Agreement and project license." Further, they stated that NMFS would revise fishway prescriptions "[o]nce the Licensees have obtained necessary consent from the Agreement parties."

Given the unresolved nature of six Settlement Agreement parties' disputes with the Services' preliminary determinations and the Utilities' attempts to implement those preliminary determinations, securing the consent from the Settlement Agreement parties necessary for NMFS to revise the fishway prescriptions seems highly improbable. Apparently understanding this, the

Utilities in their April 22, 2019 filing to the Commission claim *they are bound* by the Services' direction "to forego construction of a Merwin Downstream Facility…and Yale Upstream Facility, and instead provide habitat restoration funding in lieu of fish passage into Merwin Reservoir," but go on to explain that *contrary to the Services' preliminary determination direction*, "no amendment to the Settlement Agreement is required." Instead of seeking approval of Settlement Agreement parties by reopening the Settlement Agreement, the Utilities have moved forward with draft license amendment articles that are scientifically unsupported and procedurally incomplete, in order to circumvent the requirement for Settlement Agreement party concurrence to amend the Settlement Agreement that the Utilities cannot attain.

Continuing Delays in Implementing the Current Settlement Agreement and Licenses

The Utilities and Services have failed to meet the repeatedly extended timeline established in the Settlement Agreement and licenses to initiate design, permitting, and construction of fish passage facilities or the in-lieu fund. The most recent of multiple extensions granted by the Commission for the Utilities to comply with license Article 401(a)(8) and Settlement Agreement Section 7.6 on March 29, 2019 suggests that the Commission expected that the Services would provide "their *final* determination" [emphasis added] within the extension granted through April 12, 2019. Now, over thirteen months later, the Services have not rendered a final determination, the Commission has not granted an extension beyond April 12, 2019, and neither the Services nor the Utilities have provided an expected timeline for a final determination. Meanwhile, the Projects continue to cause unmitigated harm to ESA-listed salmon, steelhead, and bull trout, and by extension, cause ongoing harm to the Cowlitz People and their cultural heritage.

Furthermore, the Utilities propose to additionally delay the Services' decision on the appropriateness of fish passage to Yale Reservoir and tributaries for an additional period of ten years. While the existence and implementation of an in-lieu fund *was* considered in the Settlement Agreement, a delay of over a decade in either implementing fish passage or in-lieu funding was *not*. This constitutes a grave, long-term impact to ESA-listed species in the Lewis River basin, irrespective of the final disposition of fish passage or in-lieu funding for Yale Reservoir and tributaries.

None of the delays to date have been mitigated, and the draft license amendment applications do not propose to mitigate the proposed delay in deferring a fish passage decision at Yale Reservoir.

Exhibit E, section E.4.1, Fish Wildlife and Botanical Resources (18 CFR 4.51(f)(3)) Fails to Adequately Evaluate the Forgone Benefits of Fish Passage in Predicting Short- and Long-Term Impacts to Fish and Fish Habitat

The draft license amendment articles fail to adequately evaluate the impacts of the proposed amendments by ignoring the abandonment of full fish passage throughout the Lewis River basin, the centerpiece of the 2004 Settlement Agreement and 2008 licenses. Instead, Exhibit E solely evaluates the impacts of in-lieu actions.

The baseline, or no-action alternative which is *not* evaluated, includes the long-term benefits of reintroducing salmon and steelhead throughout their contiguous native range in the Lewis River basin, increasing the spatial diversity, abundance, productivity, and resilience of the populations. The returning fish would nourish riparian forests and associated wildlife with marine-derived nutrients, restoring food webs previously shattered by construction of the hydropower facilities. As a keystone species, Pacific salmon play a foundational role in supporting our ecosystems. These impacts remain unmitigated in Yale and Merwin Reservoirs and will not be mitigated through off-site actions such as those proposed in the In-Lieu Strategic Plan.

In the case of Merwin Reservoir, as proposed, fish passage would presumably be permanently abandoned, making impacts to salmon, steelhead, and their beneficiaries permanent. In the case of Yale Reservoir and tributaries, the Utilities are requesting an additional ten years for evaluation and monitoring to determine whether in-lieu actions are effective. The Utilities do not propose to mitigate for this decade of lost ecosystem function, salmon and steelhead production, and associated increased risk of extinction as a result of the hydropower projects' operations. Restoration of the lost ecosystem function is critical to the restoration of the lost cultural and heritage interests of the Tribe. Ten years is a significant delay in the restoration of these cultural and heritage aspects of the life of the Tribe.

By ignoring the benefits of the no-action alternative (i.e., contiguous fish passage), the Utilities avoid acknowledging that even with extremely optimistic modeling assumptions supporting habitat restoration (detailed below), the NMFS estimates provided in Table 2 of their April 11, 2019 communication clearly indicate that reintroduction (i.e., fish passage to/from Yale) would provide greater salmon and steelhead abundance (still ignoring other VSP parameters) for all species than would be provided by in-lieu restoration. Additionally, NMFS calls the abundance estimates for the in-lieu restoration scenario into further doubt by stating that there

> "is also uncertainty as to whether there is enough total habitat available to restore to achieve benefits equivalent to passage, enough time to realize benefits, and the likelihood of achieving pristine conditions if in-lieu restoration was selected at Yale."

By ignoring these forgone benefits, the Utilities are further obscuring a fundamental truth: fish passage as agreed in the 2004 Settlement Agreement remains the most beneficial action that could be undertaken within the Lewis River basin for salmon and steelhead. Full fish passage, therefore, remains *appropriate* and should be implemented as soon as practicable given the Commission's previously granted, unmitigated extensions.

The Strategic Plan Fails to Adequately Mitigate Impacts to Fish, Wildlife, and Botanical Resources Caused by the Proposed Amendments

The Tribe's reading of the Services' preliminary determinations to forgo fish passage to/from Merwin Reservoir reveals two general conclusions: 1) that implementing the proposed in-lieu fund will save the Utilities tens to hundreds of millions of dollars, and 2) that habitat restoration under the Strategic Plan in lieu of fish passage would produce "comparable fish population benefits."

The Tribe does not dispute that the proposed in-lieu fund would save the Utilities money. To the contrary, the record clearly indicates that money is the Utilities' *sole* motivation for proposing to abandon their fish passage obligations. If the record is not already abundantly clear on this topic, consider that *no other Settlement Agreement party has publicly supported the Utilities' stated preference to provide habitat restoration funding in lieu of fish passage to Merwin and Yale Reservoirs.* On the contrary, six Settlement Agreement parties have actively opposed the Utilities' attempts to abandon their fish passage responsibilities under the Settlement Agreement, and two additional Settlement Agreement and consultation parties (the USDA Forest Service and Yakama Nation) have submitted comments to the Services expressing concern with the proposed approach.

The Tribe does, however, dispute that the measures outlined in Strategic Plan would result in "comparable" (per NMFS) or superior (per the Utilities) benefits promoted as part of the Utilities' new information reports and subsequent lobbying of the Services' career and politically-appointed leadership and members of Congress.

The fish population abundance numbers used by the Utilities to support abandoning fish passage are based on the restoration projects' ability to instantaneously restore 22.5 kilometers of stream habitat to "template" or historic conditions – this is an impossible task. In the upper Lewis River basin, where these projects are tentatively proposed, restoring "template conditions" would require rolling back the effects of the 1980 eruption of Mt. St. Helens and instantly growing 300-year old forests on the riverbanks, as a start. Template-condition instream wood would have been recruited from this old-growth riparian forest. That wood is neither generally available for purchase nor movable when whole (as it would have been recruited naturally) with our modern transportation infrastructure. Template conditions would assume immediately and fully restored forest hydrology, including removing all forest roads that supply fine sediments and restoring old-growth forested hillsides that buffer rainfall and snowmelt. Template conditions would require selectively removing decades of excess fine sediment accumulation in the stream, while leaving gravel and biota undisturbed. Template conditions would require instantly restored food webs that evolved in the presence of robust, diverse, abundant runs of anadromous fish that annually imported marine-derived nutrients and then physically mixed them with sediments and the water column, and then fed aquatic and terrestrial biota with their expired bodies.

In other words, the collective impacts of over a century of volcanism, intensive forest management, mining, logging, recreation, stream clearing, and the cumulative fish-blocking impacts of the hydropower projects would need to be instantly rolled back. None of these outcomes are possible, and yet the abundance estimates generated by the Utilities' consultants and used to successfully lobby the Services' leadership to support their position, rely on those unachievable template conditions. Template conditions are the result of thousands of years of habitat-forming processes acting without human intervention. The Utilities, however, are shamelessly suggesting that they can restore the habitat function of a pristine ecosystem by placing wood in a few high-priority sites.

Instead of attempting to follow through on the impossible promise of restoring template conditions to 22.5 kilometers of stream habitat, the Strategic Plan provides general project types and locations, such as adding large wood to streams and attempting to reconnect off-channel and floodplain habitats. These are laudable projects, but they fall far short of the aspirational promises made by the Utilities in lobbying for their preferred alternative of implementing a modest but inadequate restoration fund in-lieu of constructing, maintaining, and operating the fish passage facilities they agreed to in the 2004 Settlement Agreement and that the Commission required in the license conditions. These are the promises upon which the Services issued their preliminary determinations, and the promises that are unfulfilled and unfulfillable by the Strategic Plan. The project examples provided in the Strategic Plan are illustrative. For example, Project EF 05 was developed to a conceptual design level by 2009, but has yet to be fully designed, permitted, or constructed, in spite of being one of the highest priority projects identified in the "Lower East Fork Lewis River Habitat Restoration Plan." It is a site-specific habitat-creation project that does not attempt to restore habitat function or process, did not consider landowner needs or interests, is very expensive for the expected habitat benefits (roughly $3,000 per linear meter in 2009 dollars), and has not been completed. The Utilities did not provide any examples of large-scale projects, or projects that intend to restore template conditions, or projects that were implemented or could be implemented within the dollars-per-kilometer figure available through the in-lieu fund.

Setting aside the impossible objective of instantly restoring template conditions in the treatment reaches in the upper Lewis River basin, the Strategic Plan fails to adequately explain how the Utilities would ensure that the in-lieu fund outcomes would be tied directly to the impacts of the projects it is meant to mitigate. Forgoing fish passage to Merwin Reservoir substantially reduces the spatial diversity of salmon and steelhead populations; the actions roughly outlined in the Strategic Plan would attempt to incrementally improve currently occupied and functional habitat in the upper Lewis River basin. These actions are not directly tied to one another: even if the Utilities' proposed habitat improvements were to improve habitat quality, they cannot increase spatial diversity or other salmon and steelhead population attributes impacted by forgoing fish passage to Merwin Reservoir and its tributaries. This ambiguity was specifically noted by the Director of the FERC Office of Energy Products in the 2008 Order Issuing New License regarding the intent of the In-lieu Fund:

> "…I do not endorse establishing a $10 million fund for the Merwin Project because of the unknown nature of any needed measures…all proposed measures [must] demonstrate a clear nexus to the objectives set forth in section 7.6.3 of the Agreement."

The uncertainty regarding the necessity and nexus of the proposed restoration measures remains to this day, as clearly highlighted in the Strategic Plan's Table 4, which shows that the recommended restoration measures in six of nine stream reaches identified by NMFS as "[t]o be determined," which indicates that the Director's concerns have been validated: in nearly a decade of attempting to establish the in-lieu fund, the Utilities still have not established either the nature or nexus of the proposed actions to mitigate the population-level impacts to salmon and steelhead caused by the Projects.

PacifiCorp owns the vast majority of shoreline as well as the lower extents of tributaries to Merwin Reservoir and has management responsibility for those habitats. This ensures that habitats on which reintroduced salmon and steelhead would continue to be managed for their benefit. The Strategic Plan shifts long-term responsibility for managing habitat to the Forest Service and other upstream landowners without adequately explaining or supporting how this long-term approach would be supported financially or jurisdictionally. The long-term habitat management and outcomes for the river reaches targeted for restoration under the Utilities' proposed license amendments are therefore outside of the Strategic Plan's purview, PacifiCorp's control, and the Commission's oversight.

The Strategic Plan outlines potential permitting pathways but does not indicate whether the Forest Service would allow or could accommodate the habitat restoration actions under their land management regime and regulations. The Tribe has partnered with the Forest Service on a number of habitat restoration projects, and can attest to the administrative difficulty of implementing modest, site-scale habitat projects on Forest Service lands, let alone landscape-scale changes indicated by the NMFS preliminary determination. The Forest Service has previously expressed written concerns regarding implementing in-lieu restoration projects on federal lands, but these concerns remain unaddressed by the Utilities and the Services.

The Utilities currently operate an annual grant round to administer the Lewis River Aquatic Fund established in the 2008 licenses. This account is chronically underspent, in large part because feasible, high-benefit, low-risk projects on Forest Service lands and elsewhere in the Lewis River basin have eluded identification and implementation, despite over a decade of work to identify and prioritize reaches and projects. The idea that additional funding and bureaucracy (detailed below) would solve this problem and open the floodgates for feasible, high-benefit, landscape-scale restoration defies logic.

The Strategic Plan fails to show how implementation could be completed quickly, as would be necessary for measuring success in time to inform the Services' decision on Yale (see comments on Monitoring Plan, below). Instead, the Strategic Plan lays out a well-worn approach to develop a multi-layer bureaucratic grant or contract program to outsource the identification, design, permitting, and implementation of landscape-scale restoration projects by unidentified agents. This is similar to the above-mentioned Aquatic Fund, in which the ACC, Services, and Utilities evaluate project proposals, but with additional layers of coordination and review by an unnamed "Program Administrator" with whom the Utilities intend to contract, and a to-be-formed "Technical Advisory Committee." These additional layers of review and process will slow the pace of implementation. Uncertainty regarding the capability and capacity of the Program Administrator and potential contractors increases the risk of program failure.

Inadequacy of Lewis River Basin Implementation Monitoring Plan ("Monitoring Plan") to Inform a Deferred Decision on Fish Passage to/from Yale Reservoir

The NMFS' April 11, 2019 preliminary determination proposed a 10-year monitoring period to ensure that the population-level effects of habitat restoration actions met or exceeded the benefits expected from providing fish passage to high quality existing habitat in Merwin Reservoir and tributaries. NMFS indicated that it would use the information gained from this monitoring period to inform their proposed delayed decision regarding whether passage to Yale Reservoir and tributaries should be rendered "inappropriate."

The Tribe reviewed an initial draft of the Utilities' Monitoring Plan and commented during an ACC meeting that the plan did not attempt to address population-level monitoring, to which the lead author of the plan expressed surprise—he had not been instructed to draft such a plan. The subsequent version of the Monitoring Plan reviewed by the Tribe as part of the draft license amendment package does attempt to address population-level effects of habitat restoration, but still focuses on "implementation and effectiveness monitoring of restoration actions at the project and reach scale," which is not adequate to evaluate population-level effects of habitat restoration.

The NMFS preliminary determination dictates that a before-after, control-impact (BACI) or similar study design should be employed to assure that restoration actions are effective. The Monitoring Plan undermines this directive, stating:

> "[u]nfortunately, a number of studies have demonstrated the need for a long time-frame (>10 years) and logistical challenges associated with this [citations omitted]. Studies have also indicated that this approach is most tractable for small watersheds (< ~100 km_2) with intensive restoration such as that completed by Solazzi et al. (2000) on the Oregon Coast."

The Monitoring Plan text continues, explaining the many challenges to effectively fulfilling the promises that the Utilities' lobbyists have made to the Services' leadership in securing favorable preliminary determinations. On page 22, the authors explicitly state that the Services' direction to use a BACI design to monitor fish population response to in-lieu habitat restoration is "not feasible for the In Lieu Program unless it was conducted on a few small tributaries."

In short, the sole goal of the Monitoring Plan should be to validate the modeled population-level increase in abundance directly attributable to in-lieu habitat restoration actions within the 10-year delay proposed to evaluate the in-lieu program's effects[1]. Instead, the Utilities' Monitoring Plan acknowledges that their population-level promises cannot be robustly validated with their proposed methods in the short timeline proposed in the license amendment applications. Indeed, these would be the first such robust, positive, large-basin results in the 40+ year history of river restoration monitoring conducted in the region, irrespective of the time available for monitoring.

[1] This suggestion should not be construed in any way as an endorsement of the in-lieu approach overall if the plan is modified in future iterations to align with this goal. The Tribe merely points out this issue to demonstrate that the Utilities have not provided a robust approach consistent with the direction of the Services.

Bull Trout Passage Plan

The scaled-down bull trout passage plans provided in lieu of multi-species upstream and downstream fish passage facilities does not provide equivalent benefits to anadromous, adfluvial, and fluvial life history strategies naturally displayed by bull trout populations throughout their range. Specifically, the lack of attraction flow proposed for use in the Yale forebay trap virtually assures that bull trout seeking a downstream pathway will be stymied. Similarly, the Swift Floating Surface Collector has not been demonstrated to effectively capture downstream migrating adults, such as bull trout and downstream-migrating steelhead kelts. Instead, monitoring data provided to the ACC has indicated that larger fish are temporarily attracted or entrained in the attraction flow, and then easily extricate themselves from the trap entrance with their superior burst speed.

Without substantial engineering improvements, bull trout will continue to be sequestered within their current distributions in Yale and Swift reservoirs and tributaries, and the primary threat of lack of connectivity will continue to pose a threat to their populations. They will also be deprived in Yale reservoir for at least another decade of the prey base that would have been provided by sympatrically co-evolved salmon and steelhead.

If you have questions about these comments, please contact Taylor Aalvik, Natural Resources Department Director at taylor.a@cowlitz.org.

Bill Iyall (May 13, 2020)

William Iyall, P.E.
Tribal Council Chairman

Cowlitz Indian Tribe comments to utilities 5-13-2020_ea

Final Audit Report 2020-05-13

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