UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232

Refer to NMFS Consultation No.:
WCR0-2018-00045

April 3, 2019

Michael Beyer
U.S. Department of Agriculture
Rural Development Loan Program
1220 SW 3rd Avenue, Suite 1801
Portland, Oregon 97204

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Beaver Creek Raw Water Supply Intake Project, Beaver Creek, Lincoln County, Seal Rock, Oregon (6th Field HUC 171002050501)

Dear Mr. Beyer:

Thank you for your letter of July 24, 2018, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the partial funding of the Beaver Creek Raw Water Supply Intake Project.

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action.

In this biological opinion (opinion), NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch*) or result in the destruction or adverse modification of designated critical habitat for this species.

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the U.S. Department of Agriculture-Rural Utility Service (USDA-RUS) and the applicant (Seal Rock Water District) must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

This document also includes the results of our analysis of the action's likely effects on EFH pursuant to section 305(b) of the MSA, and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b)(4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the USDA-RUS must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

If you have questions regarding this consultation, please contact Jennie Franks, fish biologist, in the Oregon Coast Branch of the Oregon Washington Coastal Office by phone 503.231-2344 or email Jennie.Franks@noaa.gov.

Sincerely,

Kim W. Kratz, Ph.D.
Assistant Regional Administrator
Oregon Washington Coastal Office

cc: Paul Berg, Jacobs
Adam Denlinger, SRWD
Sam Goldstein, USDA
Holly Halligan, USDA
Dana Larson, Jacobs
Brian Zabel, USACE

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the

Beaver Creek Raw Water Supply Intake Project, Beaver Creek
Lincoln County, Seal Rock, Oregon
(6th Field HUC 171002050501)

NMFS Consultation Number: WCRO-2018-00045

Action Agency: U.S. Department of Agriculture- Rural Utility Service

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Oregon Coast coho salmon *(Oncorhynchus kisutch)*	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

Kim W. Kratz, Ph.D.
Assistant Regional Administrator
Oregon Washington Coastal Office

Date: April 3, 2019

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402. We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at the Oregon Washington Coastal Office.

1.2 Consultation History

On January 11, 2018, U.S. Department of Agriculture-Rural Utility Service (USDA-RUS) requested pre-consultation, technical assistance, and engineering review for the installation of a water intake for a new water right for the Seal Rock Water District (applicant). Early coordination prior to NMFS involvement included Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Environmental Quality (ODEQ), and the Oregon Water Resources Department (OWRD). Several emails and phone conversations were exchanged between NMFS, USDA-RUS, the consultant, and Seal Rock Water district ("the District") following the initial contact on January 11, 2018.

On March 8, 2018, we received a draft biological assessment. We provided comments to the draft biological assessment on March 20, 2018 and April 4, 2018.

On May 10, 2018, we received a revised draft biological assessment. We provided comments to the revised draft biological assessment on June 1, 2018.

On July 26, 2018, we received a letter and a biological assessment from the USDA-RUS requesting initiation of formal consultation pursuant to section 7(a)(2) of the ESA and EFH consultation pursuant to section 205(b)(2) of the MSA for its partial funding to construct a new surface raw water supply from Beaver Creek near Seal Rock, Oregon. The USDA-RUS determined the proposed action is likely to adversely affect Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch*). The USDA-RUS also determined the proposed action may affect but is not likely to adversely affect or modify designated critical habitat for OC coho salmon.

On August 8, 2018, we sent an insufficiency letter and requested additional information from USDA-RUS regarding information related to the description of the proposed action, the action area, and effects to listed species and critical habitat. On August 28, 2018, we received a letter and supplemental information addressing our request for additional information. After receiving and reviewing the additional information we concluded we had sufficient information to complete consultation and therefore considered USDA-RUS initiated consultation on August 28, 2018.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). Additionally, the EFH definition of a Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The proposed action is the USDA-RUS' partial funding to the Seal Rock Water District (District) to develop a new water supply system through the USDA Rural Development Loan Program. The District will apply for a Section 404 Clean Water Act permit issued by the U.S. Army Corps of Engineers (Corps) for the construction and operation of the new municipal water intake and outfall. The USDA-RUS is the lead action agency.

The major project components include construction and operation of the following (Figure 1):

1. Electrical building and access road
2. Water intake structure and associated water withdrawals
3. Raw water pipeline
4. Water treatment plant
5. Backwash system, and associated discharges
6. Finished water pipeline
7. Monitoring and mitigation
8. Project design criteria and general construction measures

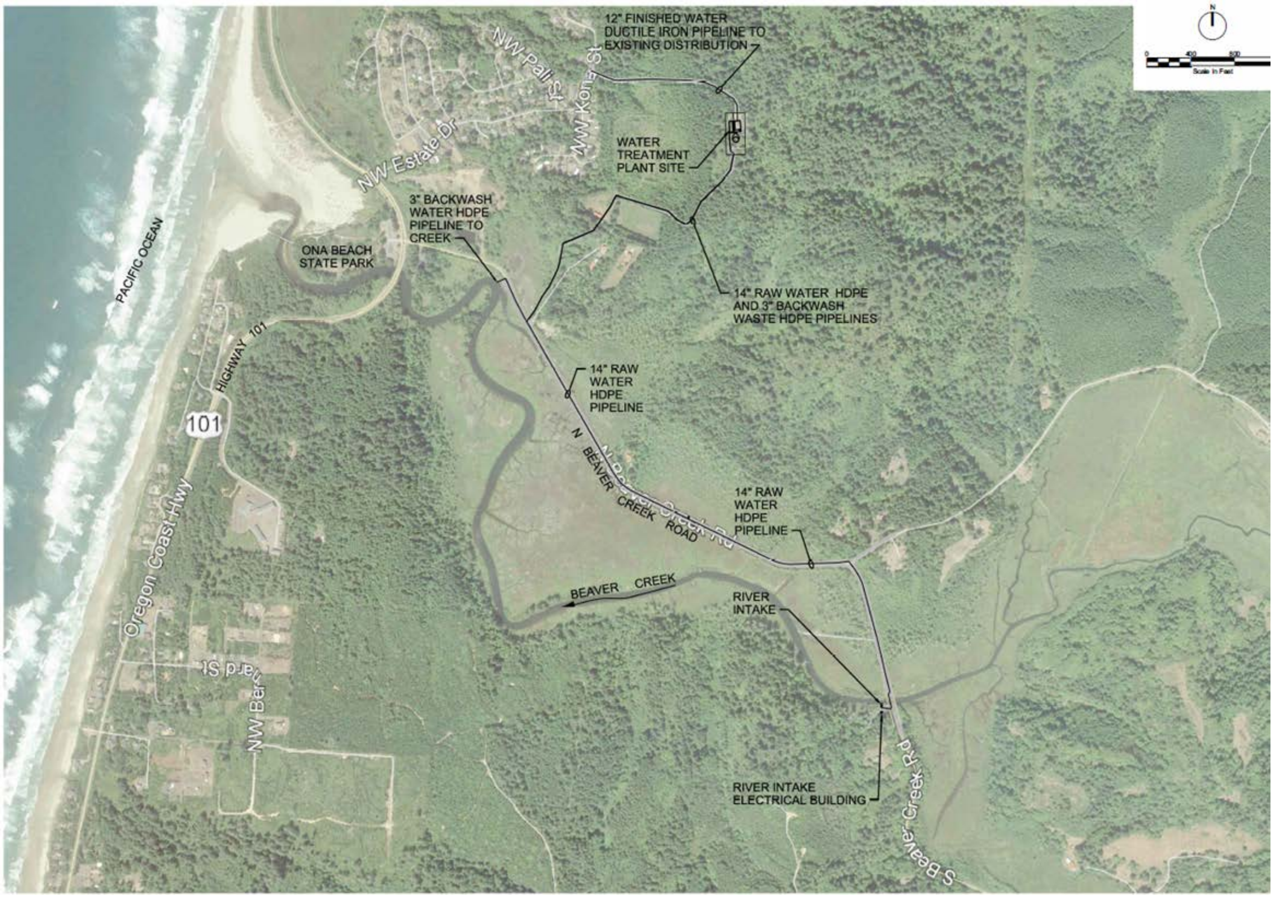

Figure 1. Project components 1 – 6 for the proposed new point of diversion on Beaver Creek.

1) <u>Electrical Building and Access Road</u>

The proposed action includes the construction, operation, and maintenance of an electrical building upslope from the water intake approximately 50 feet from Beaver Creek. The building will permanently displace 264 square feet (ft^2) (22 feet x 12 feet) of riparian vegetation and 11 trees (red alder and one spruce) less than 12 inches in diameter will be removed. An existing unpaved road from South Beaver Creek Road to the electrical building will be widened and gravel will be installed to allow vehicle access for operation and maintenance of the electrical building. One small tree will be removed to widen the access road. The access road will permanently displace 1,875 ft^2 (125 feet in length x 15 feet wide) of riparian vegetation. The road does not extend beyond the location of the electrical building. The District will install Ecoblocks or another movable barrier to limit vehicle access past the new electrical building. Only pedestrian access will be available to the intake structure. A water bar will be installed to direct stormwater runoff produced from the new impervious surface of the gravel road to existing vegetation. Fresh gravel will be placed as needed for maintenance, at an estimated 5-10 year interval.

2) Water Intake Structure

Located on the south side of South Beaver Creek Road downslope of the electrical building and access road a new water intake structure will be installed at river mile (RM) 2.1 on Beaver Creek. Approximately four trees less than 12 inches in diameter will be removed. The structure will have a screened opening, parallel with the face of the bank and below the ordinary high water (OHW) elevation. There will be three submersible pumps within the structure.

The intake screen will be an active slant wedge-wire fish screen, approximately 8 ft^2, set parallel to the creek flow, with the following specifications to meet NMFS fish screen criteria (NMFS 2011):

- The approach velocity will be less than or equal to 0.4 feet per second.
- The maximum screen angle is 45 degrees.
- A slotted screen will be used, with openings less than or equal to approximately 1/16 inch.
- The material of the screen is corrosion resistant.
- The screen area is greater than 27 percent.

The top and bottom of the slant screen will be set at elevations 8.3 feet and 6.3 feet. The placement of the screen was based on the lowest river level reported by the U.S. Geological survey for 2010-2013 using the North American Vertical Datum of 1988 (Mader and Bedford 2018). The screen will be cleaned with an automatic air-burst system.

Prior to construction, a temporary 20 foot cofferdam will be installed around the creek-facing end of the intake structure to isolate 50 linear feet or 250 ft^2 area of stream. A pump equipped with a fish screen will be utilized for dewatering operations and the return water will be detained and filtered by a vegetated strip or sediment bag prior to discharging into Beaver Creek. Fish salvage will occur and reported if OC coho salmon are present within the isolated area. The cofferdam will remain in place for up to five weeks during the Oregon Department of Fish and Wildlife approved in-water work window of July 1 to September 15. Turbidity curtains will be installed and remain in place during the installation and removal of the cofferdam. After construction of the intake is complete, native material, removed during excavation, will be placed on top of the structure to return the ground surface to its original contour. The excess excavation material of approximately 25 cubic yards will be hauled offsite for disposal.

Water Withdrawal

The District will withdraw water from Beaver Creek under the terms of their Permit to Appropriate the Public Waters (permit S-88124) from the Oregon Water Resources Department (OWRD). The right is to withdraw up to 2.0 cubic feet per second (cfs) (1.29 million gallons per day [mgd]) year-round for municipal use and has a priority date of August 26, 2015. Water withdrawal is projected to be greatest during June through September.

Their water use may also be restricted if the quality of Beaver Creek decreases to the point that those waters no longer meet federal or state water quality standards due to reduced flows, per OWRD Permit to Appropriate the Public Waters (permit S-88124).

3) Raw Water Pipeline

The raw water pipeline will be placed above the OHW elevation and will start at the water intake structure. The 14-inch diameter high-density polyethylene (HDPE) raw water pipeline will be routed from the water intake structure to the proposed water treatment plant. The raw water pipeline is approximately two miles long. The raw water line will be trenched with the exception of when the water line crosses Beaver Creek. At the existing South Beaver Creek Road bridge, the line will be hung from the bridge to the north side of South Beaver Creek Road where it will continue to be trenched within the Right Of Way (ROW).

Where the pipeline is located within the ROW, construction disturbance will be limited to paved or graveled road shoulders. The trench will then be backfilled with native material or imported soil and resurfaced to match the preconstruction conditions. After installation, the pipeline will undergo hydrostatic testing and periodically flushing will be performed with the raw water. During flushing, the raw creek water will flow in reverse and discharge through the intake screens into Beaver Creek. The discharge velocity through the intake screen will be less than 0.4 feet per second (ft/sec) and will carry any accumulated sediments and any iron or manganese that has precipitated through the pipeline. The amount that will be flushed is uncertain but it will be consistent with the natural water levels in Beaver Creek.

4) Water Treatment Plant

A new water treatment plant (WTP) and backwash basins will be constructed, operated, and maintained as part of this proposed action outside of the ordinary high water and riparian area (Figure 2). The WTP location has been partially developed with gated vehicle access to a previously existing water tank. The site will be expanded by terraced grading into the hillslope. Parking will be in gravel areas (16,000 ft^2) except for one handicapped accessible paved parking slip (88 ft^2 of pavement). All non-gravel areas (11,000 ft^2) will be reseeded with native grasses. 1.89 acres of permanent disturbance will occur at the WTP (0.89 acres is new disturbance and 1.0 acre has been previously disturbed). The WTP will be visited daily for maintenance purposes. The membrane filters will be backwashed regularly.

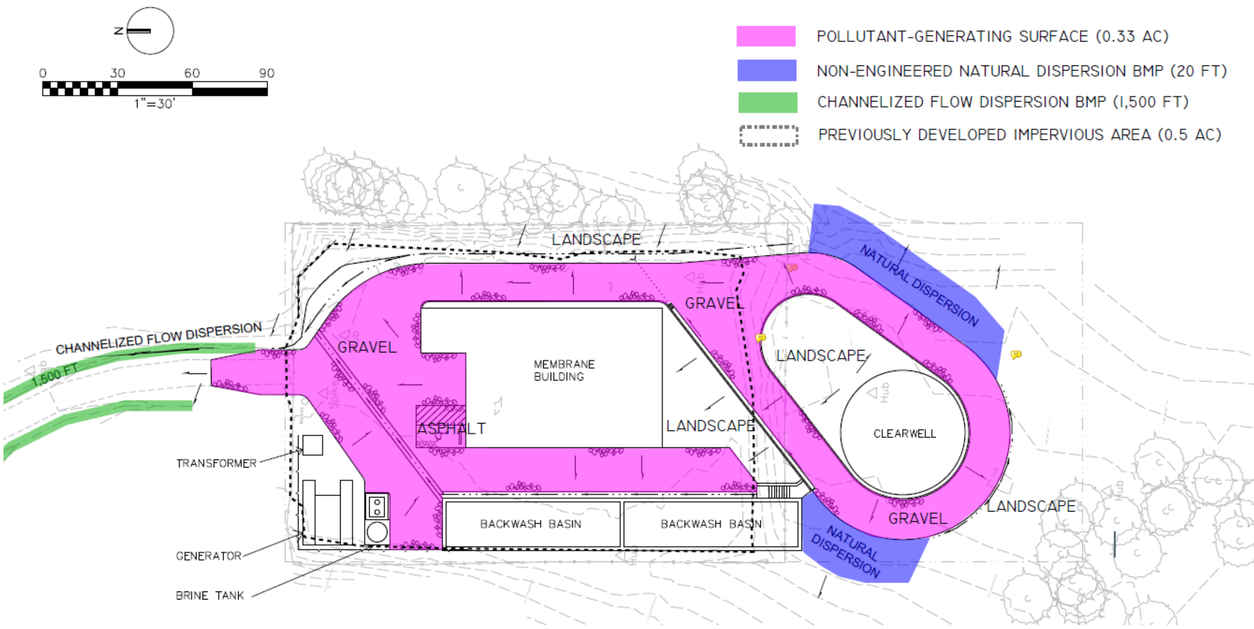

Figure 2. Water Treatment Plant.

At the water treatment plant, the raw water from Beaver Creek will flow through a low-pressure membrane filtration system before being routed to either the finished water pipeline or to the backwash basins to be discharged as backwash waste flow. During the water filtration process 4-10 mg/L of aluminum chlorohydrate (ACH) coagulant will be used depending on the raw water quality. Over 90 percent of the ACH will precipitate and be filtered. For every 1.0 mg/L of ACH added to the raw water, 0.44 mg/L of ACH particulate floc is formed. Particulate floc forms hydrated aluminum hydroxide 2Al (OH) 3, a solid that will be filtered with naturally occurring particulates as water passes through the membranes.

5) <u>Backwash System</u>

The backwash water will be generated at the water treatment plant to flush and clean the membrane filters, and will be discharged to the backwash basins before being routed into a backwash pipeline to an outfall that discharges to Beaver Creek (Figure 1). The backwash line will send the aluminum hydroxide (4-10 mg/L) along with backwash waste water to the settling basins, where roughly half will settle and the remainder will flow out through the outfall structure via a submerged, flexing (duckbill) diffuser head. After approximately two months the decant (water that has been separated from sludge) will be drawn from the offline basin and routed to the outfall, and the remaining settled solids will be pumped from the basin floor, with a submersible pump and disposed of at a designated landfill. A 3-inch diameter backwash line will be constructed to carry backwash water to the mainstem of Beaver Creek, downstream of the water intake structure by 1.6 stream miles. The typical backwash waste flow is 6 percent of the treatment rate, or 77,400 gallons per day (CH2M 2016). The maximum backwash discharged to Beaver Creek will vary by month but it is expected to be about 54 gallons per minute (gpm), during June through September during the highest withdrawal rates.

Outfall Structure. An open trench will be constructed in preparation of the outfall structure and will extend below the OHW where a temporary cofferdam will be placed. The cofferdam will surround a 100 ft^2 area around the outfall where it extends below the OHW elevation to allow all work to be performed in dry conditions and to avoid trapping or capturing coho salmon. The outfall will be constructed and completed in one day. The pipeline trench will be backfilled with native material. The outfall will be positioned about 1.5 feet below the OHW elevation of 9.0 feet. Class 1 riprap will be placed below the OHW elevation to support the pipe terminus. The riprap is not intended to dissipate energy. The vegetated riprap blanket will be approximately 4.4 cubic yards of material (4 feet wide x 30 feet long x 1 foot deep). A flexing (duckbill) diffuser head will be submerged and used at the outfall. The flexing check valve will eliminate backflow intrusion, marine fouling, and entrapped solids. The diffuser will be oriented to achieve a 30:1 dilution factor in compliance with the anticipated coverage under the ODEQ National Pollutant Discharge Elimination System (NPDES) 200-J waste discharge permit. The maximum backwash discharge flow from the outfall is expected to be about 54 gpm, during June through September (Table 1). The discharge will have an average and maximum total suspended solids (TSS) concentration of less than 1.0 mg/L, and TDS concentrations ranging from 40 to 60 mg/L.

Table 1. Monthly Minimum and Maximum Backwash Discharge Flows to Beaver Creek.

	Backwash Discharge			
	Gallons per Day		Gallons per Minute	
Month	Minimum	Maximum	Minimum	Maximum
Jan	25,200	49,800	18	35
Feb	24,600	48,600	17	34
Mar	28,200	55,800	20	39
Apr	29,400	58,200	20	40
May	29,400	58,200	20	40
Jun	39,000	77,400	27	54
Jul	39,000	77,400	27	54
Aug	39,000	77,400	27	54
Sep	39,000	77,400	27	54
Oct	29,400	58,200	20	40
Nov	28,200	56,400	20	39
Dec	30,000	59,400	21	41

6) Finished Water Pipeline

Construction of the finished water pipeline will be similar to the same process as the raw water pipeline using the open trench method. After installation, potable water will be used for hydrostatic testing and flushing of the finished water line. The test water will be dechlorinated and discharged to a nearby municipal storm drain.

7) Monitoring and Mitigation

All temporarily disturbed streambanks and riparian areas will be re-contoured to pre-existing conditions and seeded with an appropriate weed-free native seed mix within the first growing season after construction.

The District proposed the following monitoring actions:

- The District will submit an action completion report and a fish salvage report to NMFS within 90 days of completing all work below OHW.
- The District will measure the amount of water being diverted every month using a totalizing flowmeter and install and operate a streamflow gaging station on Beaver Creek following United States Geological Survey (USGS) protocol and standards during May 15-October 31 annually for 5 years. The District will submit two reports annually to the OWRD as a condition of their Permit to Appropriate the Public Waters (permit no: S-88124).
- The District will install temperature loggers upstream and downstream of the point of diversion and record water temperature at 30-minute intervals during May 15-October 31, annually for 2 years before construction and operation of the water intake and 8 years after water withdrawal begins. A water temperature report will be submitted to ODEQ and NMFS annually. The District will also monitor the water quality of the backwash discharge to Beaver Creek as stipulated in their NPDES waste discharge (200-J) permit and report annually to ODEQ. The water quality parameters being measured and monitored are described in Table 2:

Table 2. Water Quality Monitoring Parameters

Water Quality Parameter	Minimum Frequency	Type of Sample
Effluent flow (mgd)	Monthly	Record per Event
Settleable solids	Twice Monthly	Grab
Total Residual Chlorine (mg/L)*	Twice Monthly	Grab
pH	Twice Monthly	Grab

*Monitoring for total residual chlorine is to be conducted only if chlorinated water is used for backwashing

The District proposed the following mitigation actions:

- The District will install large wood with root wad set in the streambank downstream of the outfall as mitigation for the vegetated riprap and the riparian habitat loss of the water intake. The wood will be greater than 16 feet long and 16 inches in diameter. The rootwad will be anchored by burial. Willow stakes 1-1.5 inches in diameter will be inserted within the riprap generally 3 feet apart and inserted at a depth of 12-20 inches or into the seasonal groundwater table. The installation of large wood is proposed mitigation for the loss of riparian habitat at the intake structure and the backwash outfall structure.

- The District has partnered to perform 20 acres of riparian restoration on South Beaver Creek near the confluence with Oliver Creek, upstream of the District's proposed action to offset potential temperature, dissolved oxygen, and aquatic habitat impacts. Restoration activities include native tree planting (~350 trees and shrubs per acre, approximately 70 pieces of large wood installation in 150-foot riparian buffers, stream channel restoration with large wood installation and small culvert removal, and fencing.) Restoration work is anticipated to be completed by 2018, prior to the proposed action.

- The District will implement the Advanced Metering Infrastructure (AMI) program to reduce water losses. The AMI program provides the District with information on the flow of water through the system, which allows the District and their customers to control unaccounted-for water thus reducing demand on Beaver Creek. With the AMI program the District has already reduced water losses to below 15 percent, and has the potential of reducing water losses to 3 percent of less.

8) Project Design Criteria and General Construction Measures

The District will incorporate the following project design criteria and general construction measures as described in Table 3.

Table 3. Project Design Criteria and General Construction Measures

Project Design Criteria	**Brief Description**
Backwash Outfall (NMFS 2014)	• Align the backwash outfall to Beaver Creek as perpendicularly to the watercourse, as possible. • Discharge to the mainstem of the creek to enhance dispersal and dilution, and to eliminate concerns about scouring of sediment. • Ensure that the conduit is below the total scour prism. • Any large wood displaced by trenching or plowing will be returned as nearly as possible to its original position, or otherwise arranged to restore habitat functions. • Vegetate riprap below OHW elevation.
Water Management & Conservation Plan	• Water withdrawal will be consistent with the District's Water Management and Conservation Plan under OAR Chapter 690, Division 86 to ensure the beneficial use of water without waste, using best practical technologies or conservation practices.
Review of Fish Passage Plan	• The District will prepare a fish passage plan for review by ODFW to ensure that the intake facility will not impede passage of native migratory fish, per the Oregon Fish Passage Law.
General Construction Measures	
Project Design	• Minimize the extent and duration of earthwork.

Project Design Criteria	Brief Description
In-Water Work Timing	• Perform in-water work during dates recommended by the Oregon In-water Work Guidelines from July 1 to September 15 for Beaver Creek (ODFW 2008).
Fish Capture and Release	• Practice fish exclusion and capture with an experienced fish biologist using techniques to minimize take. Use electrofishing as a last resort. Monitor and report fish capture.
Work Area Isolation	• Isolate any work area within the wetted channel from the active stream whenever ESA-listed fish are reasonably certain to be present.
Site Layout and Flagging	• Before ground disturbance, clearly mark with flagging or survey marking paint sensitive areas, access routes, and staging, storage, and stockpile areas.
Staging, Storage, & Stockpile Areas	• Designate and use staging, storage, and stockpile areas to ensure that hazardous materials do not enter waterbodies. Do not dispose of non-native materials in the functional floodplain. Restore temporarily disturbed pervious areas. • Staging will occur within the temporarily disturbed areas in the ROW or road should, or within the site boundaries of the WTP site.
Pollution and Erosion Control	• Obtain and comply with the conditions of the NPDES construction stormwater discharge (1200-C) permit from the Oregon Department of Environmental Quality.
Hazardous Material Safety	• Take precautions to prevent spills or exposures to hazardous materials.
Equipment, Vehicles, and Power Tools	• Minimize damage to natural vegetation and permeable soils. Clean equipment to prevent leaks or debris entering waterbodies.
Fish Passage	• Provide fish passage for any ESA-listed fish likely to be present in the action area during construction or operation.
Dust Abatement	• Use dust abatement measures commensurate to site conditions.
Construction Discharge Water	• Avoid or minimize pollutants discharged to waterbodies in dewatering return water. Detain and treat water from dewatering prior to discharge to surface water.
Actions that Require Post-Construction Stormwater Management	• Provide stormwater management for increase of the impervious area within the project area, including roads, driveways, parking lots, sidewalks, roofs, and other waterproof structures; and changes stormwater conveyance. For water quality, provide onsite infiltration as first priority.
Site Restoration	• Restore any significant disturbance of riparian vegetation, soils, streambanks, or stream channel. Remove waste. Loosen compacted soil areas.
Revegetation	• Establish native vegetation by planting and seeding disturbed areas by the beginning of the first growing season after construction.
Utilities	• Design the raw water pipeline across Beaver Creek aerially to hang from the South Beaver Creek Road bridge. Trench the backwash outfall to Beaver Creek within containment.
Streambank Restoration	• Restore the damaged streambank at the water intake to a natural slope, pattern, and profile suitable for establishment of permanent woody vegetation using guidance from Cramer *et al.* (2002) and Cramer (2012). Use bioengineering techniques.

The District has transferred their water rights on Hill Creek (Water right # 21390 for 1.0 cfs) and Henderson Creek (Water right # 32199 for 0.4 cfs) to instream use for a period of up to 99 years as part of the OWRD approval of the Beaver Creek right. Henderson and Hill Creek are two small ocean tributaries south of Beaver Creek that are not known to have Oregon Coast coho salmon and are not designated critical habitat for OC coho salmon therefore will have no effect on Oregon Coast coho salmon or designated critical habitat

Currently, the District obtains their water from the Siletz River Basin. The existing water right is for a maximum withdrawal of 2.6 cfs but the District has elected to forego partial use of their water right under permit S-40277 or any water right derived from application S-50094 as part of the OWRD approval of the Beaver Creek right. Under these terms, the District shall not withdraw, or allow another to withdraw, water from the Siletz River, except to the extent that water is not reasonably available under their water right on Beaver Creek. The District can continue to withdraw up to 0.6 cfs from the Siletz River when withdrawing 2.0 cfs from Beaver Creek and the District can withdraw up to 2.6 cfs from the Siletz River if no water is available to be withdrawn from Beaver Creek.

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02).There are no interrelated or interdependent activities associated with this proposed action. In other circumstances, future growth in the service area enabled by the new utility can be an interdependent activity with indirect effects. However, in the case of the District's foregoing complete or partial use of existing water rights on the Siletz River, Hill Creek, and Henderson Creek, as part of the OWRD approval process for the Beaver Creek right, the new utility has a smaller withdrawal rate than the existing water right. Thus, future development will not be enabled by the construction of the new utility.

For this consultation, any impacts on listed species and critical habitat resulting from the operations of water withdrawal would be considered effects of the action (described in Section 2.5) because the USDA's proposed action is to fund the construction and operation of a new surface raw water supply intake with a new water treatment facility that will result in contaminants being discharged from the facility.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designation of critical habitat for OC coho salmon uses the term primary constituent element (PCE). The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ‘‘destruction or adverse modification’’ analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. The largest hydrologic responses are expected to occur in basins with significant snow accumulation, where warming decreases snow pack, increases winter flows, and advances the timing of spring melt (Mote *et al.* 2014, Mote *et al.* 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Tague *et al*. 2013, Mote *et al.* 2014).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Abatzoglou *et al.* 2014, Kunkel et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote *et al.* 2014). Decreases in summer precipitation of as much as 30% by the end of the century are consistently predicted across climate models (Mote *et al.* 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007, Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007, Mote *et al.* 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez *et al.* 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote *et al.* 2014).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua *et al.* 2009). Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua *et al.* 2010, Isaak *et al*. 2012). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier *et al*. 2011, Tillmann and Siemann 2011, Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer *et al*. 1999, Winder and Schindler 2004, Raymondi *et al*. 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier *et al*. 2008, Wainwright and Weitkamp 2013, Raymondi *et al.* 2013).

As more basins become rain-dominated and prone to more severe winter storms, higher winter stream flows may increase the risk that winter or spring floods in sensitive watersheds will damage spawning redds and wash away incubating eggs (Goode *et al*. 2013). Earlier peak stream flows will also alter migration timing for salmon smolts, and may flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and reducing smolt survival (McMahon and Hartman 1989, Lawson *et al.* 2004).

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote *et al*. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7^{o}C by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011, Reeder *et al*. 2013).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. Acidification also impacts sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely *et al.* 2012, Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011, Reeder *et al*. 2013). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick *et al.* 2007).

Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005, Zabel *et al.* 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011, Reeder *et al.* 2013).

For Yaquina Bay, north of Beaver Creek estuary, changes in precipitation patterns over the Coast Range will affect the Yaquina River discharges and the amount of fine sediments transported into the estuary by fluvial erosion processes. The most significant change will be the expected rise of sea level. The present rate of sea level rise in the vicinity of Yaquina Estuary is 1.22mm y^{-1} with sea level projected to increase at elevations of 6.8±5.6 cm by 2030, 17.2 ± 10.3 cm by 2050, and 63.3 ± 28.3 cm by 2100 (Burgette *et al.* 2009, NRC 2012, Brown *et al.* 2016).

A recent report mapped the landward migration zones for 23 estuaries in Oregon using LiDAR to project current and future tidal wetlands based on six sea level rise scenarios that could be expected between now and the year 2160 (Brophy and Ewald 2017). 4.7 feet above current sea level represents the upper end of the projected range of sea level rise for the years 2030, 2050, and 2100 for Newport, Oregon. At 4.7 feet increase in sea level rise, the Beaver Creek estuary is projected to gain 240% of estuarine habitat (Brophy and Ewald 2017). Even at the lowest projected sea level rise of 0.8 feet, the Beaver Creek estuary is projected to gain 40% of estuarine habitat.

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these evolutionarily significant units (ESUs) (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic impacts on species and ecosystems (Doney *et al.* 2012). These conditions will possibly intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.1 Status of the Critical Habitat

Designation-wide, critical habitat for OC coho salmon encompasses 13 subbasins in Oregon (73 FR 7816). The long-term decline in OC coho salmon productivity reflects deteriorating conditions in freshwater habitat as well as extensive loss of access to habitats in estuaries and tidal freshwater. Many of the habitat changes resulting from land use practices over the last 150 years that contributed to the ESA-listing of OC coho salmon continue to hinder recovery of the populations; changes in the watersheds due to land use practices have weakened natural watershed processes and functions, including loss of connectivity to historical floodplains, wetlands and side channels; reduced riparian area functions (stream temperature regulation, wood recruitment, sediment and nutrient retention); and altered flow and sediment regimes (NMFS 2016). Several historical and ongoing land uses have reduced stream capacity and complexity in Oregon coastal streams and lakes through disturbance, road building, splash damming, stream cleaning, and other activities. Beaver removal, combined with loss of large wood in streams, has also led to degraded stream habitat conditions for coho salmon (Stout *et al.* 2012).

Beaver Creek watershed. The specific critical habitat unit analyzed in this opinion is the Beaver Creek 5th field watershed (HUC: 1710020505). OC coho salmon use the critical habitat unit for spawning, rearing, migration, and the transition between freshwater and saltwater. CHART rated the Beaver Creek watershed as high value for watershed conservation and corridor conservation (NMFS 2007). The watershed conservation value is the relative importance of the watershed to conservation of the ESU. The corridor conservation value reflects the conservation value of the spawning areas to which it connects and the fish it serves. Activities including agriculture, forestry, grazing, and urbanization have reduced the quality and function of PBFs in this critical habitat unit. The PBFs identified for the Beaver Creek watershed are water quality, water quantity, substrate, floodplain connectivity, forage, natural cover, free of artificial obstruction, and salinity.

Siletz watershed. The Siletz River 5th field watershed (HUC: 1710020407) is analyzed in this opinion because of indirect effects of the action, i.e., potential changes to water withdrawals from the Siletz River. OC coho salmon use the critical habitat unit for spawning, rearing, migration, and the transition between freshwater and saltwater. CHART rated the Siletz watershed as high value for watershed conservation and corridor conservation value (NMFS 2007). The watershed conservation value is the relative importance of the watershed to conservation of the ESU. The corridor conservation value reflects the conservation value of the spawning areas to which it connects and the fish it serves. Activities including agriculture, forestry, grazing, and urbanization have reduced the quality and function of PBFs in this critical habitat unit. The PBFs identified for the Siletz River watershed are water quality, water quantity, substrate, floodplain connectivity, forage, natural cover, free of artificial obstruction, and salinity.

2.2.2 Status of the Species

Table 4, below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/) and are incorporated here by reference.

Table 4. Summarized listing, recovery plan, status review and limiting factor information for the Oregon Coast coho salmon evolutionarily significant unit (ESU).

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Oregon Coast coho salmon	Threatened 6/20/11	NMFS 2016	NWFSC 2015	This ESU comprises 56 populations including 21 independent and 35 dependent populations. The last status review indicated a moderate risk of extinction. Significant improvements in hatchery and harvest practices have been made for this ESU. Most recently, spatial structure conditions have improved in terms of spawner and juvenile distribution in watersheds; none of the geographic area or strata within the ESU appear to have considerably lower abundance or productivity. The ability of the ESU to survive another prolonged period of poor marine survival remains in question.	• Reduced amount and complexity of habitat including connected floodplain habitat • Degraded water quality • Blocked/impaired fish passage • Inadequate long-term habitat protection • Changes in ocean conditions

Beaver Creek coho salmon population

The Beaver Creek coho salmon population is a potentially independent population. Potentially independent is defined as a high-persistence population whose population dynamics may be substantially influenced by periodic immigration from other populations. In the event of a decline or disappearance of migrants from other populations, a potentially independent population could become a functionally independent population. The Beaver Creek coho salmon population has been predicted to be able to avoid small-population demographic risks (Wainwright *et al.* 2008).

Historically the Beaver Creek coho salmon population had approximately 265,000 smolts and 27,000 adults at a 10% marine survival (Lawson *et al.* 2007). In more recent times (1990-2017), the Beaver Creek coho salmon population has had an average adult spawner abundance of 1,828 individuals with a median of 1,511 individuals across a range of 90-6,564 individual spawners (Figure 3). In the last five years of data from 2011-2016 the average adult spawner abundance was slightly higher with 2,481 individuals with a median of 1,947 individuals across a range of 332-6,232 individual spawners.

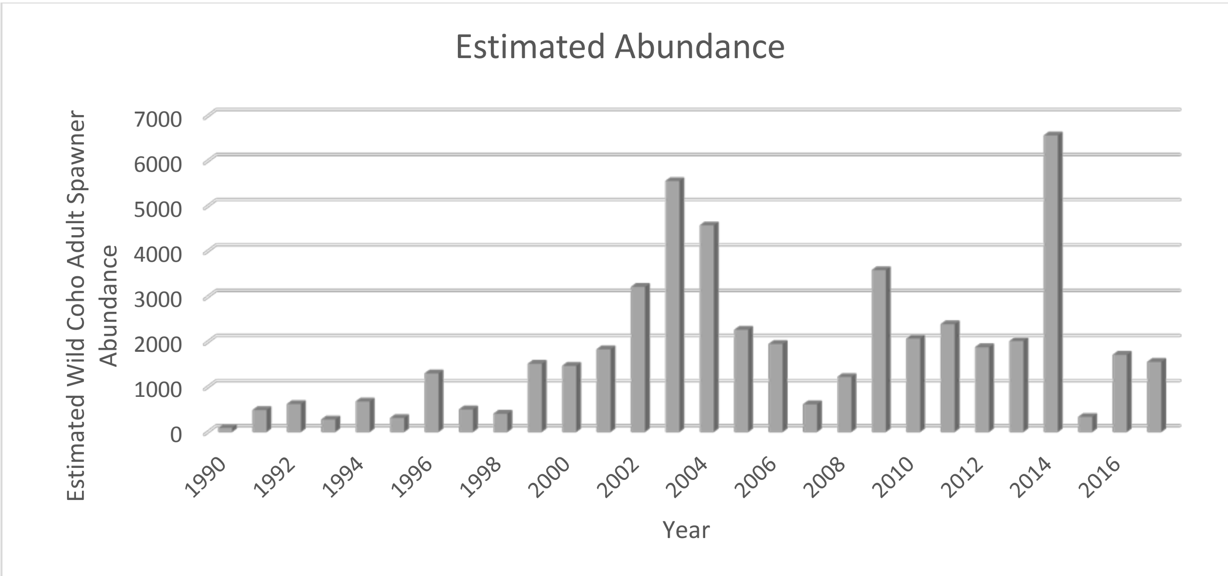

Figure 3. ODFW Adult Spawning Abundance from 1990-2017.

In general, smolts migrate out in the spring and adults return in the fall with a low level of rearing juvenile coho salmon year around. However, the floodplain wetland marsh near the mouth of Beaver Creek are heavily used by juvenile coho salmon effectively year-round, first entering the mainstem wetland marsh as zero-age smolts or as 1+ age smolts preparing to outmigrate (Spangler 2018).

The primary limiting factors for the Beaver Creek population are reduced stream complexity and reduced spawning gravel (NMFS 2016). Stream complexity refers to the ability of a stream to provide a variety of habitat conditions that support adult OC coho salmon spawning, egg incubation, and juvenile rearing. Improved water quality has been identified as a medium priority for the Beaver Creek population within the Oregon Coast Coho Recovery Plan (NMFS 2016). To improve water quality the action to be carried out is the development of a water conservation strategy for municipal and irrigation water withdrawals that is sufficient for salmonid rearing and spawning.

Siletz River coho salmon population

The Siletz River coho salmon population is a functionally independent population. Functionally independent is defined as having a high-persistent population whose population dynamics or extinction risk over a 100-year time frame is not substantially altered by exchanges of individuals with other populations. Historically, the Siletz River coho salmon population had approximately 1,217,000 smolts and 122,000 adults at a 10% marine survival (Lawson *et al.* 2007). In more recent times (1990-2016), the Siletz River coho salmon population has had an average adult spawner abundance of 6,394 individuals with a median of 2,386 individuals across a range of 207-33,094 individual spawners. In the last five years of data from 2011-2016 the average adult spawner abundance was substantially higher with 11,663 individuals with a median of 6,078 individuals across a range of 2,216-33,094 individual spawners.

The primary limiting factors for the Siletz River coho salmon population are reduced stream complexity and reduced water quality (NMFS 2016). Improved water quality has been identified as a high priority for the Siletz River coho population within the Oregon Coast Coho Recovery Plan (NMFS 2016). To improve water quality the action to be carried out is the development of a water conservation strategy for municipal and irrigation water withdrawals that is sufficient for salmonid rearing and spawning.

At the ESU level, persistence and sustainability have increased for the OC coho salmon ESU in large part to management decisions (reduced harvest and hatchery releases) and favorable environmental variation (high marine survival) (NMFS 2016). However, OC coho salmon abundance is strongly correlated with marine survival rates and marine survival rates decreased for OC coho salmon in recent years (2015-2017) with an average total native spawner abundance of 64,808 individuals. This is a decrease of 33 percent (64,808/194,416) from the three previous years (2012-2014) (ODFW 2018).

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The action area is comprised of two discontinuous areas (Figure 4).

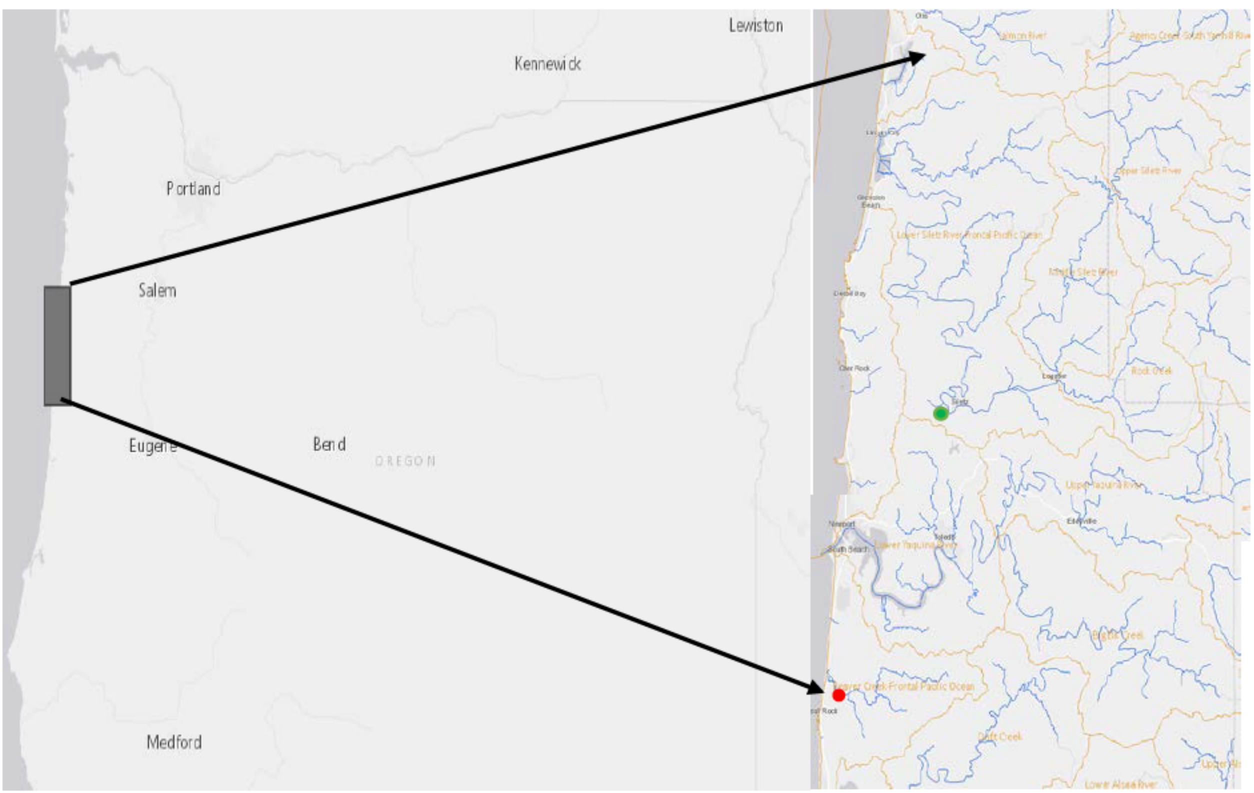

Figure 4. Illustration of the two discontinuous action areas. The green dot identifies the approximate location of the current Siletz River water intake. The red dot identifies the proposed Beaver Creek water intake location.

The upper extent of the Beaver Creek action area includes the upland 1.89 acre project footprint of the water treatment facility and backwash basins (approximately 0.80 miles north of Beaver Creek), along with 2 miles of trenched pipelines (raw water, finished water, and backwash pipelines), the electrical building, and gravel access road. The Beaver Creek action area includes the water intake and outfall footprints as well as any areas affected by construction including operation of machinery.

Due to indirect effects of the proposed action, in particular potential changes to current water withdrawals, the area of the Siletz River in Siletz, Oregon from the water intake structure downstream to the Pacific Ocean is also within the action area.

The upstream extent of the action area in Beaver Creek is the upper extent of the estuary at RM 3. The upstream extent extends beyond the location of the new water intake at RM 2.1 because of tidal surges that are likely to disperse contaminants upstream during high tides. The downstream extent of the action area is based on where effects of the water diversion become indistinguishable from background flow conditions and represent less than 1% of the lowest recorded base flow of the receiving waterbody. The downstream extent impacted by the water diversion is a larger area than the area impacted by backwash discharge because of the small amount of backwash being discharged. This is further discussed within the Opinion. Because the receiving waterbody is the Pacific Ocean, approximately 2.1 river miles downstream from the diversion, we are defining the downstream extent of the action area to be the mouth of Beaver Creek where it meets the Pacific Ocean.

The proposed point of diversion is located at the South Beaver Creek Road Bridge, 6 miles northeast of the city of Seal Rock and 10 miles southeast of the city of Newport in the Township 12 South, Range 11 West, and Section 20 in Lincoln County. The action area is in the Beaver Creek watershed, 6th Field HUC No: 171003050501, and occurs on non-Federal lands.

The action area provides both freshwater and estuarine habitat and supports adult and juvenile migration, juvenile rearing, and freshwater/saltwater transitions for the OC coho salmon ESU. The action area is designated as critical habitat for OC coho salmon. The action area is also designated by the Pacific Fishery Management Council (PFMC) as EFH for Pacific salmon (PFMC 2014) and is in an area where environmental effects of the proposed project would likely adversely affect EFH for Pacific salmon (see Section 3).

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Beaver Creek within the action area consists of a low-gradient system (<4% slope) that flows through a broad and unconfined valley through extensive wetlands with little urban development and a moderate level of logging (USFS 2001). The action area is located in a depositional reach that is very dynamic with sediment, nutrients, food and wood being deposited and contributing to critical habitat needs (USFS 2001). Beaver Creek has been ranked high for coho winter rearing habitat because of high large wood frequency, the length of side channel availability, and floodplain connectivity (Garono and Brophy 2001).

The estuary of Beaver Creek extends from the mouth of Beaver Creek at the Pacific Ocean upstream approximately 3 river miles (Hess 2016). Salt water will occasionally intrude above the water intake site (RM 2.1) for multiple-day periods during extreme high tides (CH2M 2016). Based on specific conductance measurements, storm surge conditions caused seawater to flow upstream beyond RM 2.1 13 times in the period 2010-2012 as measured by the USGS gage located at the South Beaver Creek Road bridge crossing (Hess 2016). All of these events occurred from September to May and corresponded with tides above 9.5 feet measured at the National Oceanic Atmospheric Administration tidal stage gage at Yaquina Harbor. Sea level rise resulting from climate change does pose a risk of increasing the duration and frequency of salt water events above the water intake site (Hess 2016).

Water temperature in the action area is influenced by marine water temperatures when tidal surges occur and seawater enters the estuary. Water temperature varies across a vertical water column (thermocline) and is influenced by the cooler, brackish marine water that is more dense than freshwater. The action area is not considered an impaired water body and is not 303(d) listed as water quality/temperature impaired by ODEQ. However, in 2010-2012, the 7-day moving average of the daily maximum temperature exceeded 18 ºC for 25% of days at the Hwy 101 gage and 20% of days at the South Beaver Creek gage. This indicates that at certain times during the summer months water temperature does exceed 18 ºC, which is a threshold for stress and injury to OC coho salmon. Table 5 provides the mean and maximum daily mean water temperature, by month, for 1-3 years of record (calculation period October 1, 2009 through September 30, 2013) in the action area (Hess 2016).

Table 5. Action area mean and maximum daily mean water temperatures by month (October 1, 2009-September 30, 2013).

Month	Mean Daily Mean (°C)	Maximum Daily Mean (°C)
January	7.2	7.9
February	8.1	8.7
March	8.7	9.3
April	10.4	11.0
May	11.5	12.0
June	13.3	14.1
July	16.5	17.3
August	18.0	19.1
September	16.1	17.4
October	11.9	13.1
November	9.6	10.6
December	7.7	9.1

Turbidity, iron, manganese, dissolved oxygen, percent saturation of dissolved oxygen, and pH were measured on South Beaver Creek, a major tributary to Beaver Creek, between the confluence with Oliver Creek downstream to the South Beaver Creek Road bridge (Table

6)(CH2M 2016). These measurements are the best information available and are expected to be representative of water quality in the action area.

Table 6. Water quality measurements recorded for South Beaver Creek.

Water Quality Parameter	Average	Range	Sample Size	Collection Point
Turbidity	6.9 NTU	1-33 NTU	90 (2008-2013)	South Beaver Creek Road
Iron	0.7 mg/L	-	1 (July 2016)	Hwy 101 bridge
Manganese	0.036 mg/L	-	1 (July 2016)	Hwy 101 bridge
Dissolved Oxygen	6.4 mg/L	1-10.6 mg/L	821 (2009-2013)	South Beaver Creek
% Saturated DO*	59%	40-102%	821 (2009-2013)	South Beaver Creek
pH	6.44	5.77-7.63	817 (2009-2013)	South Beaver Creek

* Dissolved oxygen saturation is calculated as the percentage of dissolved oxygen concentration relative to that when completely saturated at the temperature of the measurement depth.

There are currently 26 existing water rights on Beaver Creek and its tributaries with seven located on the mainstem of Beaver Creek. No instream water rights have been issued for Beaver Creek. Instream use refers to water use taking place within the stream channel to provide enough water for the survival and reproduction of fish. All of the 26 senior water rights are primarily for residential or irrigation use and are for approximately 3.2 cfs in total from the Beaver Creek watershed. Approximately 1.7 cfs of the 3.2 cfs is currently being withdrawn from the mainstem on Beaver Creek. OWRD determined that a municipal water right was available for the District year-round and granted a permit (S-88124) in 2015.

Figure 5 illustrates modeled monthly streamflows in Beaver Creek. At the 80 percent exceedance level, monthly streamflows range from 11.6 cfs in September to 157 cfs in February according to the OWRD Water Availability Reporting System (OWRD 2018). This means that 80% of the time stream flow exceeds 11.6 cfs during the month of September. United States Geological Survey (USGS) reported 7-day average low flows in Beaver Creek for the 2-year and 10-year recurrence intervals (Mader and Bedford 2018).

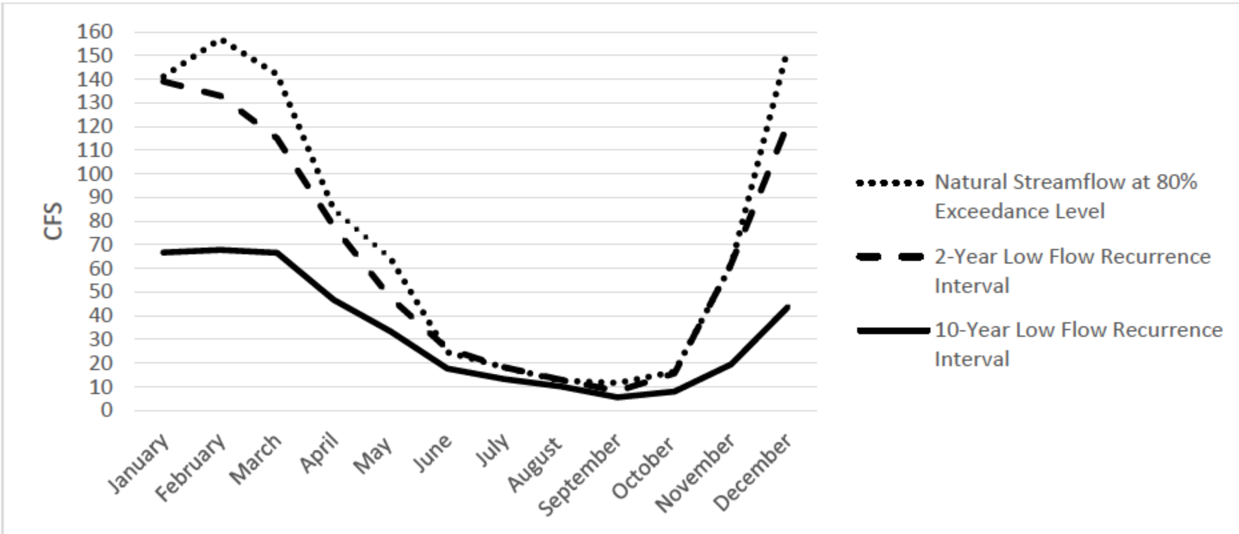

Figure 5. Natural Stream flow at 80% exceedance level (OWRD) (1958-1987), 2-year low flow recurrence interval (USGS), and the 10-year low flow recurrence interval (USGS) for Beaver Creek (1906-2005) (Mader & Bedford 2018).

Logging, stream cleanout, agriculture, and building valley bottom roads along depositional reaches have affected the functioning and quality of habitat. Agriculture and privately owned, low-gradient reaches have led to stream channelization and straightening, draining of wetlands, removal of riparian vegetation and large wood (USFS 2001). Diking, channelization, and the removal of large wood has resulted in some downcutting of the channel where depositional reaches may function more like transport reaches, moving wood and substrate out of the system and into the estuary (USFS 2001). Beaver Creek has been historically disturbed by bridge construction and bridge maintenance at the Highway 101 crossing in particular. In recent years there have been restoration efforts made on South Beaver Creek, the main tributary to Beaver Creek, to increase stream shade and improve water temperature and dissolved oxygen levels by planting over 20 acres of native plants, placing large wood and installing beaver dam foundations. In addition, approximately 36% of the watershed is currently under conservation status (Wetlands Conservancy 2008). A restoration and management plan has been developed for the lower Beaver Creek watershed with the goal of prioritizing conservation needs and promoting acquisition and restoration projects that address critical watershed restoration issues (Wetlands Conservancy 2008).

In a 2001 sixth field watershed assessment, Beaver Creek watershed was identified as having high potential for coho winter habitat (Garono & Brophy 2001). With on-going efforts in improving habitat complexity within the Beaver Creek watershed the Beaver Creek coho population will continue benefit. The action area presents a complex marsh system with little to no development further providing favorable habitat conditions for OC coho rearing, migration, and transitioning between freshwater and saltwater. Another watershed analysis conducted by the Siuslaw National Forest Waldport Ranger District identified the Beaver Creek watershed as one of the "last strongholds for OC coho salmon" because of the watershed's high proportion of low-gradient, slow flowing reaches, little urban development, and the watershed is not heavily fished (USFS 2001). Furthermore, Federal lands in the North Fork of Beaver Creek are designated as a

Key Watershed in the Northwest Forest Plan, making it a high priority for maintenance and restoration of aquatic habitat and species (USFWS 2001).

As described in Section 2.2.2 above, key limiting factors for the Beaver Creek population of Oregon Coast coho salmon within the action area is stream complexity (NMFS 2016). Improved water quality has been identified as a medium priority to restore high quality coho salmon habitat in the mainstem of Beaver Creek and applies to the environmental baseline in the action area (NMFS 2016). Actions identified in the Oregon Coast Coho Salmon Recovery Plan for the Beaver Creek population are (1) to develop water conservation strategies for municipal and irrigation water withdrawals to improve water quality that is sufficient for salmonid rearing and spawning and (2) to improve water quality by improving stream shade and substrate retention. Climate change and further habitat degradation and productivity has been identified as a primary ESU-level threat and limiting factor for OC coho salmon.

On the Siletz River, where water is currently being withdrawn from the District, from 1906 – 2018, the USGS gage station 14305500 on the Siletz River at Siletz, Oregon has recorded an average flow of 1,518 cfs. Within the last ten years, the lowest flow that has been recorded was in August of 2015 at a rate of 62.6 cfs. Currently, the Siletz River does not have water available at 80 percent exceedance (the standard OWRD considers for issuance of new water rights) during September (-3.27 cfs) and October (-76.9 cfs), after considering natural streamflow and accounting for instream flow requirements and consumptive uses (Mader & Bedford 2018).

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The new municipal water treatment plant depends on the intake for its justification and does not have any independent use apart from the intake. However, because the USDA is the lead agency and is partially funding the entirely new water supply system, the water treatment plant, water pipelines, and backwash basins will all be analyzed as part of the action rather than as an interdependent action with the intake. In addition, as an indirect effect of the action, changes to water withdrawals from the Siletz River will be analyzed as part of the proposed action.

2.5.1 Effects on Critical Habitat

The effects of the proposed action will occur in the lower Beaver Creek 5^{h} field watershed (HUC No.:1710020505) and the Siletz River 5^{th} field watershed (HUC No.: 1710020407), which is designated critical habitat for OC coho salmon. The conservation role of critical habitat in the action area is to provide habitat that supports successful juvenile and adult migration and successful juvenile rearing. Both components of the action area are used for rearing, migration, and transitioning between freshwater and saltwater. The PBFs of OC coho salmon in both components of the action area are floodplain connectivity, water quantity, water quality, forage, natural cover, salinity, and free of artificial obstruction.

Floodplain Connectivity

Floodplain connectivity will be reduced by the outfall structure and from the water withdrawal of 2 cfs.

Outfall Structure

The outfall will be positioned 1.5 feet below the OHW level up to 9 feet and stabilized by Class 1 riprap below the OHW. The riprap blanket is approximately 4 feet wide by 30 feet long and 1 foot deep to equal 120 ft^2 of area. The riprap blanket protecting the outfall will lead to a loss of floodplain habitat because the riprap simplifies the streambank and reduces off-channel habitat forming processes. The riprap blanket will be vegetated and any large wood placed at the site prior to construction will be left in place. Large wood (16' long and 16" in diameter) with root wad will be installed and anchored adjacent to the riprap blanket on the downstream end to balance the loss of floodplain habitat. With the incorporation of vegetation, large wood, and the small amount of riprap being placed, we do not anticipate a meaningful loss of floodplain connectivity or habitat loss.

The intake screen, at the intake structure, will permanently displace aquatic habitat (approximately 8 ft^2) however, it will not affect the floodplain connectivity PBF because the intake screen area will be aligned with the natural streambank slope and will not obstruct the creek's ability to connect with the floodplain.

Water Withdrawal of 2 CFS

The part of the action area within the Beaver Creek watershed is strongly connected to the floodplain along both streambanks throughout the year, including during the summer months when water is at low flow levels. A sand riffle bar at the mouth of Beaver Creek acts as an episodic natural barrier to streamflow which restricts flow and displaces water out onto the floodplain, creating a wetland marsh. In addition to the sand riffle bar, the Highway 101 crossing causes a hydraulic restriction during certain flood conditions which further promotes overbank flooding of extensive wetland marsh along Beaver Creek. The total area of aquatic habitat[1] between the Highway 101 crossing and the South Beaver Creek Road crossing, where the intake will be located, is equal to approximately 688,023 ft^2 (15.8 acres) determined by LiDAR recorded on August 5-9, 2009.

In order to analyze the effects of withdrawing 2 cfs of water and how it effects the floodplain, the relationship between stream flow and gage height must be identified. Stream flow data for Beaver Creek exists among three sources, OWRD, USGS StreamStats and USGS field

[1] Total aquatic habitat is defined as the wetted and hydrologically connected area between the Highway 101 crossing and the South Beaver Creek Road crossing that includes the wetland marsh. In this context, the wetland marsh is also considered the floodplain because it is hydrologically connected with side channels off the mainstem of Beaver Creek.

measurement data. Data derived from OWRD is based on natural streamflow data from 1958-1987 for representative streams averaging monthly stream flows at the 80 percent exceedance. Data derived from USGS is based on gaged, representative coastal watersheds over the period of 1906-2005 with each watershed having a minimum of 10 years of flow records. The third source is USGS recorded field measurements for Beaver Creek at South Beaver Creek Road (USGS gage site 14306080).

Because the OWRD and USGS data sources are modeled based on representative streams to Beaver Creek and outdated they cannot be used to accurately determine the effect of withdrawing 2 cfs and how it will affect aquatic habitat. OWRD streamflow data is modeled data based on representative streams from 1958-1987. Not only does this data not represent Beaver Creek accurately, it is also over 21 years old and does not express more recent effects of a changing climate resulting in warmer temperatures and possibly lower flow conditions. Data derived from USGS StreamStats 4.0 hydraulic model used gaged, representative coastal watersheds. The Beaver Creek watershed is hydrologically different from other gaged, representative coastal watersheds (including but not limited to the Nehalem River, Wilson River, Trask River, Nestucca River, Siletz River, Alsea River, and Siuslaw River). Beaver Creek watershed does not have a true estuary like the other gaged coastal rivers in the sense that the river mouth opens up into a large estuary before discharging to the ocean. Beaver Creek does not have sufficient flow for fish passage to the ocean year-round like the other gaged, coastal rivers. Furthermore, data derived from USGS StreamStates 4.0 has a high degree of uncertainty noted by large confidence intervals that underestimate and overestimate streamflow values.

USGS recorded field measurements for Beaver Creek at South Beaver Creek Road for two years to primarily study conductivity and water temperature (Hess 2016) (USGS gage site 14306080). This gage was located in the same location in which the proposed intake will be constructed. The gage recorded data between May 26, 2010 and April 23, 2013 in which 10 field measurements were collected (Table 7). This dataset, although limited to just 10 measurements, is the most reliable dataset in identifying the relationship between stream flow and gage height on Beaver Creek.

Table 7. Summary of Field Collected Data at USGS Site 14306080 (South Beaver Creek Road).

Field Measurement	Date Collected	Measured Gage Height (ft)	Streamflow (cfs)	Channel Area (ft^2)	Velocity (ft/sec)
1	5/25/2010	9.41	126	516	0.24
2	11/23/2010	10.22	364	574	0.63
3	1/18/2011	11.29	484	688	0.7
4	1/19/2011	10.78	369	643	0.57
5	4/22/2011	9.48	197	610	0.32
6	10/26/2011	8.97	5.92	51.2	0.12
7	1/27/2012	10.22	510	655	0.78
8	7/3/2012	9.14	48.6	512	0.1
9	11/12/2012	9.5	173	557	0.31
10	2/8/2013	10.03	152	567	0.27

A stage-discharge curve was identified based on the above 10 field measurements (Figure 6). Six out of the ten field measurements were made between November and February weighting the stage-discharge curves toward higher stream flows. The linear regression model assumes a normal distribution to model the relationship between the two variables. We analyzed the data using a logarithmic single variate regression to accurately display the non-linear relationship and found the two models do not statistically differ. Therefore, for our analysis, we use the linear regression equation in Figure 6. The R squared value in Figure 6 describes how close the data are to the fitted regression line.

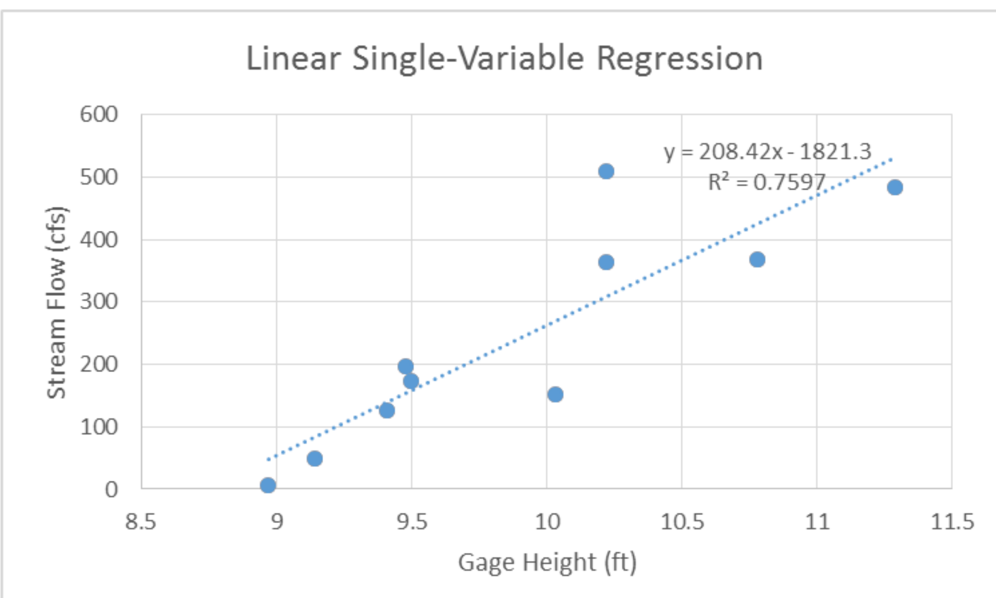

Figure 6. Stage-Discharge Curve for Beaver Creek; USGS Site 14306080 (South Beaver Creek Road).

Because there is only one low flow data point, we could not establish a confident relationship between gage height and stream flow during low flow conditions. If the stage-discharge relationship at low flow was the same linear relationship as the other data points we would expect to see an origin of zero meaning that when stream flow is zero then gage height is zero. Based on the field measurements taken of Beaver Creek, the stage-discharge relationship suggests that during low flow conditions the stage-discharge relationship is different than the one shown in Figure 6. This may be due to the geomorphology of Beaver Creek or other variables. However, because this is the best available information, for this consultation, we will assume this stage-discharge relationship holds true at low flow conditions in order to determine the amount of floodplain habitat that may be impacted by the withdrawal of 2 cfs while recognizing there is a high amount of uncertainty regarding this relationship.

The lowest streamflow field measurement is recorded at 5.92 cfs collected on October 26, 2011 at a gage height of 8.97 ft. This represents the most reliable, field-verified low flow measurement and will be used as the worst case scenario and basis for aquatic habitat reduction at low flow. By withdrawing 2 cfs from 5.92 cfs, stream flow would be measured at 3.92 cfs during a low flow event, assuming no other variables have changed to influence the amount of stream flow (i.e. groundwater influences). Using the linear equation in Figure 6, we calculated what the gage height would be at 5.92 cfs and what the gage height would be at 3.92 cfs. 5.92 cfs represents a maximum low flow scenario before withdrawing 2 cfs from 5.92 cfs. 3.92 cfs represents the minimum low flow scenario after withdrawing 2 cfs from 5.92 cfs assuming a linear relationship between stage height and discharge. The range provides a minimum and maximum gage height of what to expect during a low flow condition with the full water right of 2 cfs being withdrawn.

<u>Lowest Gage elevation with 2 cfs withdrawal</u>
When Flow is 3.92 cfs:
$y = 208.42x - 1821.3$
$3.92 = 208.42x - 1821.3$
$1825.22 = 208.42x$
$x = 8.75$ ft

<u>Lowest Gage elevation prior to withdrawal</u>
When Flow is 5.92 cfs:
$y = 208.42x - 1821.3$
$5.92 = 208.42x - 1821.3$
$1827.22 = 208.42x$
$x = 8.77$ ft

With high uncertainty and assuming the same linear regression equation as the other field measurements, we assume that gage height will be 8.8 feet when withdrawing 2 cfs when the low flow is at 5.92 cfs or less. To validate our assumptions that gage height does not vary greatly based on the volume of water flow, we used the field-verified measurements from the USGS gage station 14306080, to predict stream flow over time using the stage-discharge curve relationship in Figure 7. Stream flow varied by 734 cfs over the range of measured gage height, which only varied by 3.72 feet. Beaver Creek flow roughly increases 210 cfs for every 1-foot increase in the gage height. This supports the assumption that during low flow conditions the withdrawal of 2 cfs will not have a major change in gage height.

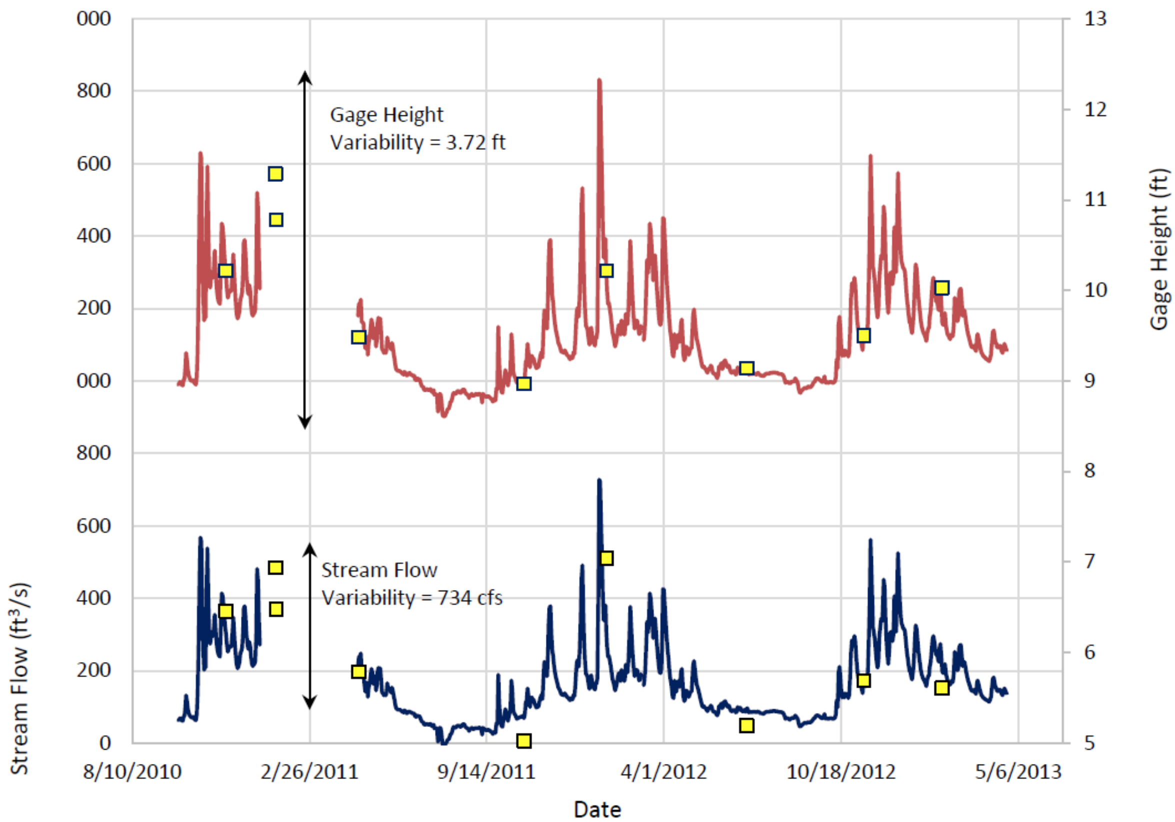

Figure 7. Daily Recorded Gage Height and Predicted Stream Flow for Beaver Creek; USGS 14306080 (South Beaver Creek Road). Yellow points represent the actual field measurement data point.

Using DOGAMI LiDAR, 688,023 ft^2 of aquatic habitat has been identified using water surface area elevation between the Highway 101 and the South Beaver Creek Road crossings (Mader & Bedford 2018). Using linear regression, we were able to determine the amount of habitat that would potentially be impacted with the water withdrawal of 2 cfs (Figure 8). To determine this relationship, the channel volume was calculated at each data point (assuming constant cross-section width) and divided by the channel depth (assuming constant depth). The channel depth was back-calculated from the LiDAR and channel cross section area at the given water surface elevation. With this calculation we had to assume a linear relationship in order to estimate the amount of habitat that would potentially be impacted by water withdrawal.

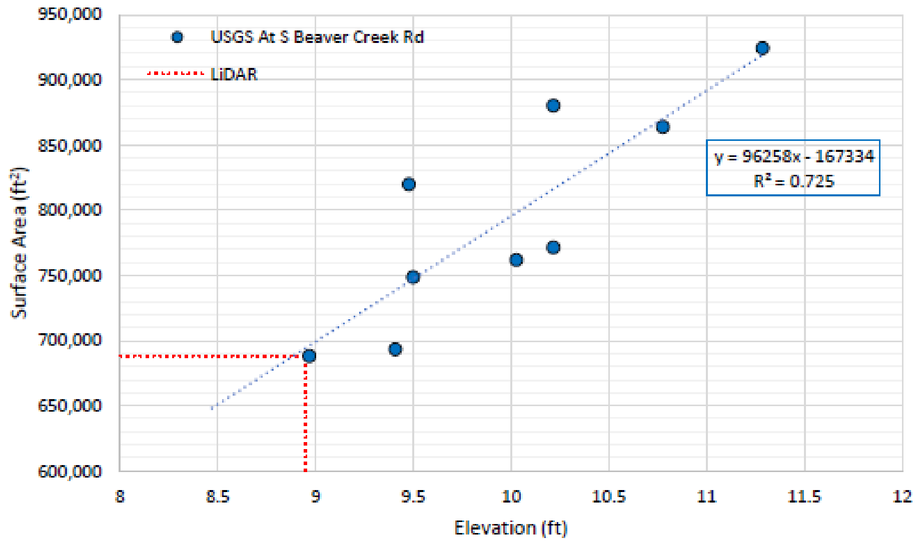

Figure 8. Surface area discharge curve for Beaver Creek; between USGS Site 14306080 (South Beaver Creek Road) and USGS 14306085 (Highway 101).

The relationship between elevation (ft) and surface area (ft^2) is equal to the following equation:

y = 96,258x – 167,334

Following the assumptions mentioned above and using the gage height values of 8.7 ft, we calculated the amount of wetted aquatic habitat accessible by OC coho salmon during a low flow condition with the full water right of 2 cfs being withdrawn.

<u>Accessible habitat at low flow conditions with 2 cfs withdrawal</u>
When Flow is 3.92 cfs:
y = 96,258x – 167,334
y = 96,258(8.75) – 167,334
y = 674,924 ft^2
y=15.49 Acres

If there is a total area of 688,023 ft^2 (15.8 acres) of aquatic habitat, given the assumptions mentioned, we determined that at 8.75 ft of water surface elevation when Beaver Creek may experience a low flow event of 5.92 cfs and the District is withdrawing the maximum amount of 2 cfs there will be an approximate loss of floodplain habitat of 13,099 ft^2 (0.3 acres). This amount of floodplain habitat loss equals 1% of the total aquatic habitat area between Highway 101 and South Beaver Creek Road crossings.

With the best available information and making assumptions using the worst case scenario of a low flow of 5.92 cfs during the summer months while withdrawing the full water right amount of 2 cfs, the approximate reduction in aquatic habitat is small and minor compared to the total amount of floodplain habitat for rearing juvenile OC coho salmon.

Water Quantity

The water withdrawal will minimally affect 2 stream miles of Beaver Creek downstream of the new intake to the Pacific Ocean all year long for perpetuity by reducing the amount of water available for OC coho salmon rearing and migration. The water quantity PBF will be most affected during summer low flow events when juvenile rearing of OC coho salmon occur. The reduction of 2 cfs will reduce habitat, with the potential to indirectly increase water temperatures during the summer months during low flow periods, and may indirectly decrease dissolved oxygen.

In the Siletz basin, the District will partially forgo their use of their rights to withdraw water (2.6 cfs) from the Siletz River except to the extent that water is not reasonably available under their water right on Beaver Creek. The additional 2 cfs will have little to no impact on the average base flow of 1,518 cfs. During a low flow condition of 62.6 cfs, the additional 2 cfs could increase stream flows by 4 percent. Also, since the Siletz River is over allocated particularly during the months of September and October, the additional 2 cfs provides a small improvement on water quantity within the Siletz River. It is difficult to determine with any accuracy if the additional 2 cfs will improve water quantity when water is over allocated during the months of September and October. Therefore, for the purposes of this consultation we have assumed that the additional 2 cfs, although an improvement for the Siletz basin, will have little to no positive impact on the Siletz River coho population or the ESU.

Related Effects on Habitat Availability

The action area is strongly connected to the floodplain along both streambanks throughout the year, including during the summer months when water is at low flow levels. Any reduction in habitat from the water withdrawal will affect water quantity on the floodplain and the main channel. As described (see *Floodplain Connectivity PBF above*), using the best available information and making assumptions using the worst case scenario of a low flow of 5.92 cfs and withdrawing the full water right amount of 2 cfs, the amount of habitat lost would equal 1% of the total aquatic habitat area between Highway 101 and South Beaver Creek Road crossings (0.3 acre).

Related Effects on Water Temperature

Reduced river volume results in decreased depths, slower velocities, and lower thermal inertia. All of these allow solar radiation to more efficiently warm the stream. The negatively correlated relationship between stream discharge and temperature has been studied at length on rivers such as the North Platte River (Sinokrot and Gulliver 2000, Ruochuan *et al.* 1998) and Tuolumne River (Mesick 2010). Reducing water quantity can result in increased summer water temperatures at and immediately downstream of withdrawal sites because a shallower stream will heat up faster than a deeper stream. Water diverted from Beaver Creek will reduce flows below the intake (RM 2.1). Reduction in river flows can influence thermal regime and result in greater frequencies of elevated temperatures (Sinokrot and Gulliver 2000).

Stream temperature change is a function of the total heat energy transfer and mass transfer (i.e. water volume, water withdrawal) (Boyd and Kasper 2003). With the best available information we are unable to quantify the relationship of water temperature and stream flow. Making assumptions and considering the worst case scenario of a low flow event of 5.92 cfs and withdrawing the full water right amount of 2 cfs, it is anticipated that only 1% of the total aquatic habitat area will be lost. The amount of water being withdrawn is a small amount compared to the amount of water lower Beaver Creek stores. As described in Figure 7, the gage height is insensitive to stream flow with flow increasing by 210 cfs for every 1-foot increase in gage height. Large volume and deeper water bodies, including lower Beaver Creek, are less responsive to temperature changes than small streams (Boyd and Kasper 2003). The withdrawal of 2 cfs will not have a major impact on the gage height or water volume therefore stream temperature is not anticipated to change because of the withdrawal of 2 cfs.

Related Effects on Dissolved Oxygen

Beaver Creek is a low gradient system within the action area and is hydrologically connected to the wetland marsh and restricted by the sand riffle bar at the mouth creating a ponding effect within the action area. In late summer when stream flow is low and high temperatures are present there is likely a decrease in dissolved oxygen concentrations. In the late summer, higher water temperatures hold less oxygen, low stream flow results in decreased mixing and re-oxygenation, and decomposition of the naturally produced organic material uses some of the available oxygen (Reid 1961). Groundwater further contributes as a source of low dissolved oxygen (DO) by discharging large amounts of carbon dioxide and minimal amounts of oxygen.

Stream flow can affect the concentration of DO. Low flow conditions are much less conducive to oxygenation and when water temperature is high, DO can become critically low.
It is not possible to accurately predict how the withdrawal of 2 cfs on Beaver Creek will influence or not influence DO concentrations beyond its natural conditions, in part because it is unfeasible to assume that the withdrawal of 2 cfs would be the only factor (if at all) contributing to any change in DO concentrations in a dynamic environment such as Beaver Creek. Although we are unable to calculate the relationship between the proposed water withdrawal of 2 cfs and DO, we do know that higher water temperatures hold less oxygen and result in low DO concentrations. Based on our analysis, we concluded that stream temperature is not anticipated to change because of the withdrawal of 2 cfs. Because stream temperature is unlikely to change, DO is unlikely to measurably decrease as a result of the water withdrawal.

Water Quality

Suspended Sediment

Short-term increase in suspended sediment will occur during the removal of riparian vegetation, construction of the intake, widening of the access road, construction of the outfall, and removal of the work area isolation structures. Suspended sediment will be at its highest following the installation and removal of the two coffer dams (intake and outfall), after which it will settle out of the water column. The background turbidity levels have been measured on South Beaver Creek, the main tributary to Beaver Creek (Mader and Bedford 2018). The water intake is located approximately 0.19 stream miles downstream of the confluence of South Beaver Creek with Beaver Creek. We can assume the background turbidity levels will be the same at South Beaver Creek as at the location of the -water work will occur because South Beaver Creek is the largest tributary within the Beaver Creek watershed contributing a significant amount of stream flow into Beaver Creek and is located in close proximity to the location of the water intake on Beaver Creek. The average turbidity measured in South Beaver Creek was 6.9 NTUs and ranged from 1-33 NTU.

During dewatering operations from isolating the area around the intake, a pump equipped with a NMFS approved fish screen will be utilized and the return water will be detained and filtered by a vegetated strip or sediment bag prior to discharge to Beaver Creek. Construction of the intake is anticipated to only take 4 weeks but the cofferdam will remain in place for 5 weeks, allowing the work to remain isolated after trenching activities until any suspended sediment inside has settled.

The work at the outfall will occur at 1.5 feet below the OHW elevation up to 9 feet and disturb a total ground area of 120 ft^2. The work performed below the OHW elevation will be performed in dry conditions. The 120 ft^2 area will be filled with vegetated riprap and large wood stabilizing the loose soil and reducing the amount of suspended sediment. Furthermore, suspended sediment effects from the installation and removal of the two cofferdams will be minimized with the use of turbidity curtains.

Because stream size and the length of the average distance of visible suspended sediment are related, partly because mixing characteristics are relatively dependent on stream width (Rosetta 2005), we assume that the distance increased suspended sediment will be visible is proportional to the size of the disturbance and the width of the wetted stream. Because the width of Beaver Creek at the intake site and outfall is larger than 30 feet but less than 100 feet wide, we estimate that increased suspended sediment will be visible for approximately 100 feet downstream of the isolated areas.

This may be an overestimate because the District will most likely perform construction in late summer when the wetted water width and flows are smaller; however analysis at the full width will give the District more flexibility in scheduling construction. Therefore, it is reasonable to expect that there will be measurable effects from suspended sediment and sedimentation on the water quality PBF for approximately 150 feet (i.e., the linear distance of the isolated work area at the intake and 100 feet downstream from it). The outfall structure has a smaller isolated work with 20 linear feet of isolated work. Measurable effects from suspended sediment from the outfall structure will be 120 feet. Some sediments will continue to be transported farther, but because the plume will no longer be visible, any effects associated with suspended sediment or sedimentation will be immeasurable at distances greater than 120 feet downstream of the isolated work area. Because work area isolation will extend less than a quarter of the Beaver Creek active channel, measureable suspended sediments are unlikely to be distributed across the entire width of the river.

Chemical Contaminants

Operation of excavators and other construction equipment near sensitive habitats, such as streams and wetlands, create the potential for introduction of toxic materials (i.e., fuel, petrochemicals and lubricants) into the stream or into the adjacent riparian zone from accidental spills or mechanical failure. Based on experience with construction activities, the probability of a fuel spill, equipment malfunction, or accident is more than negligible. Proposed project design criteria, including equipment not entering the wetted active channel, work area isolation, frequent inspections, and use of a staging area for vehicle staging will minimize the probability and extent of unintentional chemical contamination, such that an accidental spill is unlikely to occur. However, in spite of proposed project design criteria, it is reasonable to expect that a few drops (up to an ounce) of contaminants may drip from equipment onto the streambed or streambank and adjacent riparian area. The magnitude of effects on the water quality PBF from such an occurrence will be immeasurable and undetectable because of the low volume of contaminants and large volume of water in Beaver Creek.

Outfall Effluent

The District's effluent discharge is regulated under ODEQ's 200-J Filter Backwash General Permit under the NPDES issued pursuant to ORS 468B.050 and The Federal Clean Water Act. The permit covers effluent discharge of filter backwash, backwash basin, and reservoir cleaning water which have been adequately treated prior to discharge. It also includes the flushing of raw water intakes after storm events and spring runoff. The permit allows a mixing zone that does not extend downstream beyond a distance of 30 feet from the points of discharge and shall not exceed one-half the width of the receiving stream.

The flushing of the intake will occur periodically using the raw (untreated) water to clear any accumulated sediment, and iron and manganese that precipitated in the pipeline during the use. The infrequent flush at a velocity less than 0.4 ft/sec is not anticipated to carry a large enough amount of sediment to establish a measurable turbidity plume. The amount of iron and manganese being flushed will be consistent with natural levels considering that raw water is being used to flush the intake.

In general, discharge of municipal wastewater effluent adversely affects water quality in a receiving water body. The severity and extent of adverse effects are directly related to the level of treatment and the baseline water quality. The backwash effluent contains the supernatant from the backwash basin. Supernatant is wastewater that has received sufficient treatment and is the runoff from the backwash basin. The discharge will have an average and maximum TSS concentration of less than 1.0 mg/L, and a TDS concentration ranging from 40-60 mg/L. The new water treatment plant will use a low-pressure membrane filtration system. Membrane systems usually have greater removal performances as a result of increased solids captured and longer solids retention times (Neemann *et al.* 2008).

In addressing the effects of releasing these pollutants at the diffuser, we need to understand the relationship between the mixing zone, tidal ebb and flow, water exchange, and flushing rates. A sand bar located at the mouth of Beaver Creek largely controls the frequency and magnitude of inundation of ocean water into the estuarine system. Salt water will occasionally intrude above the water intake site of multiple-day periods during extreme high tides (CH2M 2016). The USGS monitored conductivity and concluded that during strong storm surge conditions with tides above 9.5 feet (measured at the National Oceanic Atmospheric Administration tidal gage stage at Yaquina Harbor) seawater entered Beaver Creek 13 times in a two year period (2010-2012) with a specific conductance above 20,000µS/cm measured at the Hwy 101 bridge crossing (Hess 2016). All of these events occurred from September to May and most frequently occurring in October (Hess 2016).The estuary extends upstream to approximately 3 river miles (Hess 2016). Because of tidal surges that extend beyond the water intake site at RM 2.1, it is likely that contaminant dispersion upstream occurs during extreme high tides and could extend to the upper extend of the estuary at RM 3.

Outside of the mixing zone, released contaminants do not disappear, but their concentrations are much lower. The outfall duckbill diffuser is located at RM 0.6 downstream of the water intake at RM 2.1 set below the ordinary high water elevation. The mixing zone extends 30 feet around the diffuser and the stream flow at the outfall will provide a 30:1 minimum dilution ratio with the effluent during periods of discharge in accordance with the ODEQ's 200-J Filter Backwash General Permit. Beyond the mixing zone, during the summer months when the demand for water is at its highest (2 cfs), the maximum amount of backwash to be discharged is 54 gpm or 77,400 gallons per day (gpd) (0.1198 cfs). At a low flow scenario of 3. 92 cfs with a maximum effluent discharge of 54 gpm, the WTP effluent is diluted by a factor of 33. The average monthly mean flow during the month of September at the 80 percent exceedance level is 11.6 cfs, a dilution factor of 97.

When we consider the volume of effluent (peak discharge of 77,400 gallons per day), tidal ebb and flow, water exchange, and flushing rates, we find the concentrations of contaminants analyzed in more detail below may be acute in the zone of influence with only trace and undetectable levels within the rest of Beaver Creek. Therefore, the magnitude of effects on the water quality PBF from the outfall effluent will be undetectable because of the low volume of contaminants and large volume of water in Beaver Creek.

The NPDES permit the District will be operating under regulates effluent flow, TSS, TDS, pH, and temperature at the outfall. Effluent flow (mgd) will be recorded monthly, settleable solids, dissolved solids, and pH will be recorded twice a month with a grab sample. Chlorine will not be added to the backwash effluent.

<u>Settleable Solids.</u> A settleable solid refers to material of any size that will not remain suspended or dissolved in a holding or backwash basin that is not subject to motion, and excludes both TDS and TSS. Aluminum hydroxide will be added to the raw water in the backwash basins, where roughly half will settle and the remainder will flow out through the decant for discharge to the stream. Decant water is water that has separated from sludge and is removed from the layer of water above the sludge. The settleable solids will be pumped out of the basin and disposed of properly in a landfill. Settleable solids will be monitored twice a month.

TSS. Total suspended solids is a measure of the amount of particles in a solution. The NPDES permit requires the District to an average TSS of 1.0 mg/L daily. TSS will be monitored twice a month. When aluminum hydroxide floc particles react with hydrochloric acid, aluminum chlorohydrate (ACH) is formed. ACH is a coagulant used during the purification process of drinking water and is the primary TSS found in the outfall effluent excluding natural TSS already present in the raw water withdrawn from the intake. ACH is considered a secondary contaminant (OAR 333.61). A secondary contaminant is a contaminant at which the levels that are generally found in drinking water, do not present an unreasonable risk to health but do have adverse effects on taste, odor, and color of water.

TDS. Total dissolved solids is a measure of the dissolved combined content of all inorganic and organic substances contained in a liquid in molecular, ionized, or micro-granular suspended form. The District expects an average TDS of 40-60 mg/L daily.

pH. pH is the measure of alkalinity/acidity of water. The NPDES permit requires the District to maintain discharge pH between 6.0 and 9.0. The pH values for South Beaver Creek, a tributary of Beaver Creek upstream of the action area averaged 6.44 pH with a range of 5.77-7.63 pH units (Mader and Bedford 2018). pH is to be monitored twice a month.

Temperature. With the backwash basin retention time of 3-5 days, temperature of the backwash discharge may increase in temperature before being discharged into Beaver Creek. If the water temperature warms to the ambient air temperature during summer months, it may warm to the upper end of the water temperature range for Beaver Creek at 20°C. At the maximum discharge rate of 0.1 cfs during a low flow year of 5 cfs, a change in temperature would account for 2% of the flow and the warmer water would likely dissipate quickly and would not have an additional impact on water temperature in Beaver Creek.

Stormwater

The WTP membrane building, the clear well tank, WTP parking lot, electrical building, and access road will contribute to increasing stormwater pollutants. The WTP membrane building, clear well tank, and parking lot will convey stormwater runoff offsite through natural dispersion. Parking will be in gravel areas (16,000 ft^2) except for one handicapped accessible paved parking slip (88 ft^2). All non-gravel areas (11,000 ft^2) will be reseeded with native grasses. The existing unpaved access road to the water intake site will also be expanded and gravel will be installed to create a total of 0.04 acres of new impervious surface. The electrical building will also add 0.01 acres of new impervious surface. The total amount of new impervious surfaces equals 1.94 acres.

Stormwater runoff from impervious surfaces delivers a wide variety of pollutants to aquatic ecosystems, such as metals (*e.g.*, copper and zinc), petroleum-related compounds (e.g., polynuclear aromatic hydrocarbons), and sediment washed off the road surface (Driscoll *et al.* 1990, Buckler and Granato 1999. Colman *et al.* 2001, Kayhanian *et al.* 2003). Aquatic contaminants often travel long distances in solution or attached to suspended sediments, or gather in sediments until they are mobilized and transported by the next high flow (Anderson *et al*. 1996, Alpers *et al.* 2000a and 2000b).

Temporary increases in stormwater from construction impacts and the loss of riparian vegetation will also occur but will be minimized with erosion and pollution control designated staging area, reseeding lost vegetation, and other best management practices described in Table 3.

A water bar will be incorporated along the access road to slow runoff to allow infiltration before entering Beaver Creek. Vehicle access will be limited with blocks and the WTP will be gated to minimize access to service vehicles approximately one visit per day. The WTP site is approximately 10 feet upland of a non-fish bearing tributary to Beaver Creek. The non-fish bearing tributary opens up into a wetland before connecting to the mainstem of Beaver Creek. Because of the low traffic load (average one daily vehicle), the distance from Beaver Creek, and the on and off-site vegetation, stormwater runoff will be reduced through infiltration although not eliminated. Small amounts of stormwater pollutants may still enter into Beaver Creek but will likely be small enough in which it is undetectable.

Forage

Sedimentation (see *Water Quality – Suspended Sediment* above) is also likely to contribute to temporary decreases of aquatic macroinvertebrates resulting in reduced prey availability for rearing juvenile coho salmon (Bjornn and Reiser 1991, Suttle *et al.* 2004). Because isolating the work area is likely to dewater the area, this action will also temporarily decrease aquatic invertebrates in the action area. Work area isolation and dewatering will occur for a total area of approximately 250 ft^2 of in-stream substrate/macroinvertebrate habitat at the intake structure site. All work at the outfall will occur in the dry and will require dewatering of approximately 100 ft^2 to equal a total of 350 ft^2 that is isolated and dewatered for both the intake and outfall structures. Measurable suspended sediment, associated with construction and removal of the work area isolation structure and subsequent re-watering of the dry area, is expected to settle onto the substrate for approximately 150 feet downstream of the intake isolation area and 120 feet downstream of the outfall isolation area (i.e., the linear distance of each of the isolated work areas and 100 feet downstream from it- *see Water Quality- Suspended Sediment above*). However, aquatic invertebrates (e.g., larval insects, obligate aquatic insects, mollusks, crustaceans) re-colonize disturbed areas by drifting, crawling, swimming, or flying in from adjacent areas. The time required for re-colonizing aquatic invertebrates to reach pre-disturbance abundance levels and equilibrium is related to the spatial scale of their initial habitat loss, the persistence of the excluding or disturbing mechanism, the size of adjacent or remnant invertebrate populations (i.e., potential colonizers), the season in which the disturbance is taking place, and the life history characteristics of the invertebrate species (Mackay 1992). Reduction in the food PBF resulting from the work area isolation and sedimentation will be short-term because adjacent invertebrate populations will quickly recolonize the disturbed substrate as the summer-fall work window coincides with high levels of invertebrate activity. Additionally, only a small portion of Beaver Creek (350 ft^2) will be affected and it is unlikely that this small area will sufficiently reduce prey in the large mainstem river to an extent that the quality and function of the food PBF will be meaningfully decreased.

The loss of aquatic habitat area (*see Floodplain Connectivity- Water Withdrawal of 2 cfs above*) will reduce the amount of prey availability to rearing juvenile OC coho salmon during low flow periods in the late summer, early fall months. Using the best available information and making assumptions using the worst case scenario of a low flow of 5.92 cfs during the summer months while withdrawing the full water right amount of 2 cfs, the amount of floodplain habitat that will be lost is 13,099 ft^2 (0.3 acres) out of a total area of 688, 023 ft^2 (15.8 acres) of available aquatic habitat between Highway 101 and South Beaver Creek Road crossings. This reduction in habitat is 1% loss of habitat out of the total available aquatic habitat of 15.8 acres.

The amount of floodplain habitat that would be lost is small compared to the total amount of floodplain habitat for rearing juvenile OC coho salmon. Therefore, the amount of prey/forage that is reduced from the loss of floodplain connectivity is minimal and is unlikely to sufficiently reduce prey to an extent that the quality and function of the food PBF will be meaningfully decreased.

Natural Cover

A decrease in natural cover will occur from the loss of riparian vegetation during construction. 4.87 acres of upland and riparian vegetation will be temporarily disturbed during the construction of the WTP, backwash basins, all three pipelines (raw, finished, & backwash water), access road, electrical building, intake and the outfall. Out of 4.87 acres, 128 ft^2 (0.003 acres) is below the OHW and 3,920 ft^2 (0.09) acres are within 50 feet of Beaver Creek. All temporarily disturbed riparian and upland vegetation will be reseeded with a native seed mix.

Permanently, 128 ft^2 of riparian vegetation will be removed and replaced with an outfall riprap pad (120 ft^2) and the submerged water intake (8 ft^2). The 120 ft^2 of riprap that is being placed will be vegetated and willow stakes will be planted. Also, a large wood root wad larger than 16' in length and 16" in diameter will be placed downstream of the outfall as mitigation for the riprap pad and the impact of the water intake of (8 ft^2). The streambank that will be impacted by the intake will be re-contoured to a natural slope, pattern, and profile suitable for the establishment of permanent woody vegetation using bioengineering guidance from Cramer *et al*. (2002) and Cramer (2012) with the exception of the 8 ft^2 of the intake hatch at the top back side of the intake structure.

Before replanted vegetation can grow, mature, and function to improve water quality, the loss of riparian vegetation will reduce shade, leaf litter, and forage for juvenile OC coho salmon in the action area. Riparian vegetation provides habitat for terrestrial macro-invertebrates which can fall into streams and become food for juvenile salmonids. Vegetation will regenerate in disturbed areas in addition to the plantings which can provide habitat complexity, serve as future sources of large wood, and increase species diversity in the project area other than at the intake and new riprap area, upon completion of construction activities. The decrease in riparian vegetation will not measurably affect the natural cover PBF in the action area because it is a small amount of lost vegetation (128 ft^2) and the action area baseline has more than adequate natural cover. The effects of the action on benthic food sources is discussed above as an issue stemming from changes in water quality by increased suspended sediment and an isolated work area.

Change in Salinity

As stated in the environmental baseline (Section 2.4), salt water will occasionally intrude above the water intake site of multiple-day periods during September to May and correspond with tides above 9.5 ft measured at the National Oceanic Atmospheric Administration tidal stage gage at Yaquina Harbor (Hess 2016). Because fresh water is less dense than saltwater, it floats on top of the saltwater creating a steep halocline where little mixing between freshwater and saltwater occurs. The halocline is the vertical zone in which salinity changes rapidly with depth, located below the freshwater surface layer. During the winter months when salt water is likely to be present in the action area, a maximum of 2 cfs of freshwater could be withdrawn having a potential influence on the halocline by having a higher ratio of saltwater to freshwater within the action area. During winter months flow ranged from 173 cfs in November of 2012 to 484 cfs in January of 2011. If a change in salinity does occur due to the withdrawal of 2 cfs, it would be a slight change (1% change) and would not have a measurable impact on juvenile rearing OC coho salmon habitat because good quality habitat is accessible upstream of the action area and juvenile OC coho salmon could move upstream if the slight change in salinity affects their location within the estuary.

Free of Artificial Obstruction

Construction & Water Intake

During construction the use of a 20 x 50 foot cofferdam surrounding the water intake structure will temporarily enclose 250 ft^2 of area. The cofferdam will not obstruct more than one-quarter of the active channel width. The area will be isolated during the preferred ODFW in-water work window from July 1 to September 15 and is anticipated to be isolated for up to five weeks. A second cofferdam will be placed temporarily at the outfall during construction and will isolate approximately 100 ft^2 of area for one day during the in-water work window. Both cofferdams will reduce the availability of habitat within the dewatered construction area (350 ft^2) among the two construction sites (intake & outfall). However, cofferdams will be present only during the preferred in-water work window for five weeks prior to the peak migration period and will not obstruct more than one-quarter of the active channel width therefore the cofferdams will not have a measurable impact on the free of artificial obstruction PBF.

The intake will be screened with a screen that meets NMFS screen criteria (reviewed by a NMFS fish passage engineer[2]). Therefore, water withdrawal is extremely unlikely to reduce the PBF for rearing or migration because NMFS criteria are based on protecting the smallest fry-sized salmonid (NMFS 2011).

Impedance/Delayed Adult Migration

With the information available, it cannot be quantified or determined how much or how long the transition area would be disconnected from the lower reach of Beaver Creek to the ocean that would possibly delay or impede passage for adult OC coho salmon. This is also highly variable

[2] Email correspondence dated March 12, 2018, addressed to Dana Larson (CH2M), Paul Berg (CH2M), and Jennie Franks (NMFS) from Jeff Brown (NMFS) verifying the fish screen is consistent with NMFS fish screening criteria.

depending on the onset of rain events and the base flow when migration occurs. However, with a field observation made in April of 2018, we made some assumptions to identify connectivity between the Pacific Ocean and the lower reach of Beaver Creek.

The abrupt slope break (600 feet above the mouth of Beaver Creek) sets a minimum gage height for the upstream control section and causes slack water creating the wetland marsh within the action area. The sand riffle bar on April 12, 2018 was observed as being approximately 260 feet wide and 4-10 inches deep, with gravel to cobble-sized substrate (Mader and Bedford 2018). On April 12, 2018 the high tide was predicted at 6.9 feet at 10:00 am at the Yaquina Bay tidal gage (9435385). This is the closest tidal gage to the action area and was used to make inferences to how often tidal surges occur within Beaver Creek (Hess 2016).

Using the worst case scenario of a low flow scenario occurring at 5.92 cfs and withdrawing the full water right of 2 cfs, we made the following assumptions based on best available information:

1. Assuming that the flow level of 5.92 cfs is the same from South Beaver Creek Road crossing to the mouth and assuming that the withdrawal of 2 cfs affects stream flow equally for the entire wetland marsh between South Beaver Creek Road to the sand riffle bar,

2. And assuming the linear regression stage-discharge curve holds true as described in Section 2.5.1 we know that when flow is 3.92 cfs (5.92 cfs–2 cfs) the gage height is 8.75 feet.

If stream depth was observed at 4-10 inches deep at the sand riffle bar when the tidal height was 6.9 feet at 10:00 am on April 12, 2018 we can assume that with a gage height of 8.75 feet, stream flow will be deeper than 4-10 inches. The minimal water depth that has been reported in which adult coho salmon were holding was found in a British Columbia stream ranging from 1.9–7.9 inches (Fausch and Northcote 1992). Therefore, with the above assumptions, streamflow will be sufficient at the sand riffle bar and will not impede passage or delay adult migration.

Additional Mitigation Actions

Additional mitigation measures described in the proposed action include partnering to perform 20 acres of riparian restoration along South Beaver Creek near the confluence with Oliver Creek, upstream of the District's proposed action to offset potential temperature, dissolved oxygen, and aquatic habitat impacts. Restoration activities include native tree planting (~350 trees and shrubs per acre, approximately 70 pieces of large wood installation in 150-foot riparian buffers, stream channel restoration with large wood installation and small culvert removal, and fencing.) The District will also implement the Advanced Metering Infrastructure (AMI) program to reduce water losses. This program can be considered a water conservation strategy to improve water quantity that is sufficient for salmonid rearing and spawning. This type of action has been identified a specific action for the Beaver Creek OC coho salmon population within the OC coho salmon recovery plan (NMFS 2016).

While the proposed riparian restoration would likely have net beneficial effects, its implementation and success is reliant on many partners and, with the general information currently available, it is difficult to ascertain with any certainty the scope and scale of its beneficial effects. Continued implementation of the District's AMI program will also likely have beneficial effects but it is not clear if those effects are properly attributable to the proposed action and it is also difficult to predict with any certainty the scope and scale of those effects. Given these uncertainties, we have not factored any anticipated benefits into our analysis and conclusions.

Summary of effects on critical habitat

The proposed action will result in short-term and long-term effects on floodplain connectivity, water quantity, water quality, forage, and natural cover PBFs. It is reasonably certain that the proposed action will not have a meaningful effect on forage, natural cover, salinity and free of artificial obstruction PBFs.

Short-term effects includes suspended sediment from construction activities and disturbed riparian vegetation that will temporarily effect the water quality PBF. The effects from construction-related chemical spills are too small or too unlikely to have meaningful consequences on the water quality PBF.

Long-term effects includes the maximum habitat loss of 13,099 ft^2 (0.3 acres) as a result from the withdrawal of 2 cfs during a worst-case scenario low flow period of 5.92 cfs. This loss of habitat will have a minor effect on the floodplain connectivity, water quantity, and forage PBFs for rearing juvenile OC coho salmon because the amount of aquatic habitat that is being lost (0.3 acres) is small compared to the total amount of floodplain habitat available for rearing juvenile OC coho salmon. With the reduction of habitat, water temperature and dissolved oxygen are not likely to measurably decrease as a result of the withdrawal of 2 cfs. The water quality PBF will be minimally affected by the outfall effluent and increases in stormwater pollutants from new impervious surfaces.

Given the uncertainties regarding beneficial effects from riparian restoration plans for South Beaver Creek and continued implementation of the AMI program, we have not factored such effects into our analysis.

It is difficult to determine with any accuracy if the additional 2 cfs within the Siletz River basin will improve water quantity when water is over allocated during the months of September and October. Therefore, for the purposes of this consultation, we have assumed that the additional instream water will have little to no positive impact on the water quantity PBF for the Siletz coho salmon population.

2.5.2 Effects on Species

Water Quantity- Water Withdrawal

The water withdrawal will slightly reduce water quantity for approximately 2 stream miles of Beaver Creek downstream of the new intake to the Pacific Ocean all year long for perpetuity. OC coho salmon use this area for adult and juvenile migration, juvenile rearing, and transitioning from freshwater to saltwater. The timing of OC coho salmon use in this area from ODFW is displayed in Table 8. In general, smolts migrate out in the spring and adults return in the fall with a low level of rearing juvenile OC coho salmon year around. However, the floodplain wetlands of the action area are heavily used by juvenile OC coho salmon effectively year-round, first entering the action area as zero-age smolts or as 1+ age smolts preparing to outmigrate (Spangler 2018).

Table 8. Life stage of OC coho salmon within the action area. The light shade represents periods of presence with uniformly distributed level of use, the middle shade represents a lesser level of use based on professional opinion, and the dark shade represents periods of peak use based on professional opinion.

Life Stage of OC Coho	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Upstream Adult Migration												
Juvenile Rearing												
Downstream Juvenile Migration												

The withdrawal of water associated with the proposed action has the potential to:

1. Impede or delay passage of adult salmonids migrating in fall by further exacerbating passage at the hydraulic control point (sand riffle bar) of Beaver Creek to the Pacific Ocean (too little water for fish to swim through from the ocean).

2. Indirectly affect juvenile rearing with reduced habitat from withdrawing water during the summer months during low flow periods.

We describe the potential effects, in order, below.

The effects of water withdrawal will occur year-round. Individual smolts and adults will be exposed for a week or two during the spring and fall respectively as they migrate through the action area. A high level of rearing juveniles will be exposed to adverse effects of water withdrawal.

Impedance/Delayed Adult Migration

With the best available information (*see Free of Artificial Obstruction*) using the worst case scenario of a low flow scenario occurring at 5.92 cfs, withdrawing the full water right of 2 cfs, and making some assumptions (described above), we can conclude that stream flow at the mouth of Beaver Creek will be deeper than 4-10 inches which exceeds the minimal depth needed for adult coho salmon to maintain a holding pattern (Fausch & Northcote 1992). If streamflow is deep enough to maintain a holding pattern, we can deductively state that a streamflow deeper than 4-10 inches will not hinder passage. Therefore, the withdrawal of 2 cfs will not impede passage or delay adult migration.

Juvenile Rearing- Reduced Habitat

Water withdrawal would be greatest during June through September where the full-use maximum water withdrawal is anticipated to reach 1.25 cfs as compared to their full water right of 2.0 cfs by 2040 (CH2M 2017). However, demand will increase in the future and there are no commitments by the District to withdraw at rates lower than the maximum amount of 2 cfs. Water diverted from Beaver Creek will reduce stream flow below the point of diversion (RM 2.1). During the summer months of interest (June-September), the District will divert a minimum of 1 cfs and a maximum of 2 cfs.

Using the best available information and making assumptions (*See Floodplain Connectivity*) there is a total area of 688,023 ft^2 (15.8 acres) of available aquatic habitat. We determined that at 8.75 ft of water surface elevation when Beaver Creek may experience a low flow event of 5.92 cfs and the District is withdrawing the maximum amount of 2 cfs there will be a loss of 13,099 ft^2 (0.3 acres) of floodplain rearing habitat. This amount of floodplain habitat loss equals 1% of the total aquatic habitat area between Highway 101 and South Beaver Creek Road crossings. The amount of rearing habitat that would be lost is small to the total amount of floodplain habitat for rearing juvenile OC coho salmon.

Without site specific information it is difficult to quantify the individuals adversely affected by the proposed action. Using the best available scientific information we can estimate the number of individuals affected by the reduction of flow. Nickelson (2012) estimated that 180-270 smolts per acre can rear per acre of wetland. Prior to the withdrawal, there is a total of 15.8 acres that could rear an estimated 2,844–4,266 OC coho salmon smolts. If habitat is reduced to 15.49 acres using the above mentioned assumptions and example of 3.92 cfs as a minimum low flow condition then it is estimated that a loss of 56-84 OC coho salmon smolts would be affected by the loss of habitat.

Using the maximum amount of individuals at 84 multiplied by the estimated average freshwater (0.03) and marine survival (0.07) between 1999 and 2016 (Suring and Lewis 2017, ODFW 2017) results in the equivalent of less than one adult (0.18) during a one-time low flow scenario year.

Adult Migration & Juvenile Rearing-Temperature

Adult migration and juvenile rearing life stages of OC coho salmon are within the action area and influenced by any change in temperature. Temperature ranges and associated effects analyzed in the EPA's Proposed Approval of Certain Oregon Water Quality Standards Including Temperature and Intergravel Dissolved Oxygen Biological Opinion are stated in the following table (NMFS 2015):

Table 9. Summary of temperature considerations for salmon and steelhead life stages.

Life Stage	Temperature Consideration	Temperature & Unit
Juvenile Rearing	Lethal temperature (1-week exposure)	23−26°C (constant)
	Optimal growth • Unlimited food • Limited food	13−20°C (constant) 10−16°C (constant)
	Rearing preference temperature in lab and field studies	10−17°C (constant)
	Impairment to smoltification	12−15°C (constant)
	Impairment to steelhead smoltification	>12°C (constant)
	Disease risk (lab studies) • High • Elevated • Minimized	>18−20°C (constant) 14−17°C (constant) 12−13°C (constant)
Adult Migration	Lethal temperature (1-week exposure)	21−22°C (constant)
	Migration blockage and migration delay	21−22°C (average)
	Disease risk (lab studies) • High • Elevated • Minimized	>18−20°C (constant) 14−17°C (constant) 12−13°C (constant)
	Adult swimming performance • Reduced • Optimal	>20°C (constant) 15−19°C (constant)
	Overall reduction in migration fitness due to cumulative stresses	>17−18°C (prolonged exposure)

Higher temperatures above optimal range can decrease metabolic energy for feeding, reduce growth and reproductive behavior, increase exposure to pathogens, decrease food supply, and increase competition from warm water tolerant species (Brett 1952). As described above (*see water quantity- increase in temperature*), the withdrawal of 2 cfs will not have a major impact on the gage height or water volume therefore stream temperature is not anticipated to change because of the withdrawal of 2 cfs and juvenile growth and adult migration will not be negatively affected.

Water Quantity -Decreased Dissolved Oxygen

Adequate concentrations of dissolved oxygen in freshwater streams are critical for the survival of salmonids. Reduced levels of dissolved oxygen can impact growth and development of different life stages of salmonids including adult migration and juvenile rearing. Impacts can affect fitness and survival by decreasing the size of fry, increasing the likelihood of predation, and decreasing feeding activity (Carter 2005).

As mentioned above (*See water quality - dissolved oxygen*), using the best available information we cannot accurately determine how DO will be effected by the withdrawal of 2 cfs beyond its natural conditions in part because it is unfeasible to assume that the withdrawal of 2 cfs would be the only factor (if at all) contributing to any change in DO concentrations in a dynamic environment such as Beaver Creek. Although we are unable to calculate the relationship between the proposed water withdrawal of 2 cfs and DO, we do know that higher water temperatures hold less oxygen and result in low DO concentrations. Based on our analysis, we concluded that stream temperature is not anticipated to change because of the withdrawal of 2 cfs. Because stream temperature is unlikely to change, DO is unlikely to measurably decrease as a result of the water withdrawal and will not change the water quality conditions for OC coho salmon.

Water Quantity-Siletz River Basin

As discussed above (see water quantity- critical habitat effects), the District will partially forgo their use of their rights to withdraw water (2.6 cfs) from the Siletz except to the extent that water is not reasonably available under their water right on Beaver Creek. It is difficult to determine with any accuracy if the additional 2 cfs will improve water quantity when water is over allocated during the months of September and October. Therefore, for the purposes of this consultation we have assumed that the additional 2 cfs, although an improvement for the Siletz basin, will have little to no positive impact on the Siletz River coho population or the ESU.

Water Quality

Suspended Sediment

Of key importance in considering the detrimental effects of suspended sediment on rearing juvenile OC coho salmon are the concentration and duration of the exposure. High levels of suspended sediment can be lethal to salmonids; lower levels can cause chronic sublethal effects including loss or reduction of foraging capability, reduced growth, reduced resistance to disease, reduced respiratory ability, increased stress, and interference with cues necessary for homing and migration (Bash *et al*. 2001). Sublethal effects (such as olfactory effects) are those that are not directly or immediately lethal, but are detrimental and have some probability of leading to eventual death via behavioral or physiological disruption. These responses can include changes in territorial behavior, alarm reactions with downstream displacement and increased predation and competition, avoidance behavior, decreased feeding, and reduced growth (Noggle 1978, Berg 1983, Lloyd 1987, Newcombe and Jensen 1996, Bash *et al*. 2001, Robertson *et al.* 2006).

Turbidity will increase from upland ground disturbances during the construction of the electrical building, in-water work during the building and removal of the proposed cofferdams, and some runoff will occur from areas with limited vegetation in the years following tree and shrub removal, until replacement vegetation establishes roots. The substrate at the intake is fine to medium grained sandstone and the substrate at the outfall site is composed of silt, sand, and gravel. The substrate near the intake and outfall locations are loosely stable and we anticipate turbidity and suspended sediment increases to occur and settle within 150 feet downstream of the intake and 120 feet downstream of the outfall. Quantifying the number of individuals exposed to adverse concentrations of suspended sediment is very difficult for several reasons. Density of juvenile rearing OC coho salmon in the mainstem is low and their locations hard to predict. The plumes will only effect a narrow strip of the river, which is approximately 10 feet wide, and coho salmon are known to move and avoid suspended sediment plumes (Servizi and Martens 1992). Therefore, while we cannot predict the exact number of juvenile OC coho salmon affected precisely, we are reasonably certain it will be a small number.

Most increases in turbidity following the water path direction will be transported downstream through the wetland where it will be deposited within the estuary.

Increased turbidity will also disturb juvenile salmonid benthic food sources. Benthic food items will be temporarily reduced by deposition of sediment suspended during construction activities in the isolated work area, even after reintroduction of flow. The relatively calm waters downstream from the action area will allow large particulates to settle out of the water column quickly, limiting disruptions to the benthic production in the action area, and sediment will drop out, limiting impacts on benthic species.

Based on the foregoing analysis, effects on benthic food items are likely to have minor, localized effects on juvenile salmonids rearing in the action area for a period of weeks during the time the intake cofferdam is in place and pollution and erosion control measures described in Table 3 are being followed. It is unlikely that the proposed action will result in measurable changes to the forage community over the long-term and will not reduce prey availability for juvenile salmonids.

Outfall Effluent

The District's effluent discharge is regulated under ODEQ's 200-J Filter Backwash General Permit under the NPDES.

<u>Settleable Solids.</u> A settleable solid refers to material of any size that will not remain suspended or dissolved in a holding or backwash basin that is not subject to motion, and excludes both TDS and TSS. Aluminum hydroxide will be added to the raw water in the backwash basins, where roughly half will settle and the remainder will flow out through the decant for discharge to the stream. When aluminum hydroxide floc particles react with hydrochloric acid, aluminum chlorohydrate (ACH) is formed. ACH is a coagulant used during the purification process of water drinking water and is the primary TSS found in the outfall effluent excluding natural TSS already present in the raw water withdrawn from the intake.

<u>TSS.</u> Total suspended solids is a measure of the amount of particles in a solution. The NPDES permit requires the District to an average TSS of 1.0 mg/L daily. The ACH that does not settle out in the backwash basin is considered a secondary contaminant (OAR 333.61). A secondary contaminant is a contaminant at which the levels are generally found in drinking water, do not present an unreasonable risk to health, but do have adverse effects on taste, odor, and color of water. Fish are generally sensitive to aluminum and ACH. According to the material data safety sheet, ACH has been identified as having acute toxicity to fish (Geo Specialty Chemicals 2015). The lethal concentration for a fathead minnow (*Pimephales promelas*) is identified as 776 mg/L within a 96 hours static time period. The median effective concentration for a fathead minnow

(*Pimephales promelas*) is identified as 265.5 mg/L within a 96 hour static time period. Although these concentrations have been identified for the fathead minnow and not for salmon, it is the best available information regarding fish toxicity of ACH. The amount of ACH that will be discharged into Beaver Creek will be less than the total amount of TSS discharged (1.0 mg/l daily). This amount is far below the median effective concentration and lethal concentrations of ACH therefore it is not likely to affect OC coho salmon.

Increases in TSS concentrations as low as 17 mg/L can increase inflammation of the gills and lead to respiratory stress, when juvenile coho salmon are exposed for periods as short as 4 hours (Berg and Northcote 1985). Increases in TSS as low as 30 mg/L can result in behavioral responses (e.g., changes in territorial behavior) of juvenile coho salmon exposed to suspended sediment pulses for periods as short as 4 hours (Berg and Northcote 1985). Increases in TSS at a concentration of 53.5 mg/L for a 12-hour period caused physiological stress and changes in behavior in coho salmon (Berg 1983). Suspended sediment concentrations at 1200 mg/L for a 96-hour period killed juvenile coho salmon (Noggle 1978). Rearing juveniles are the only life stage potentially exposed to TSS concentrations for a duration long enough to exceed the 17 mg/L for 4 hours threshold above. Under the proposed action, the daily average TSS concentrations will be limited to 1.0 mg/L, far below injury levels for juvenile coho salmon. We are confident that the amount of TSS concentrations and the amount of affected area is small. Furthermore, it is unlikely that rearing juveniles will stay within the current of the affected area for the required 4 hours for any injury effect to occur.

<u>TDS</u>. The District expects an average TDS of 40-60 mg/L daily. TDS are naturally present in water and changes in TDS concentrations from discharge effluent will change the water balance.

A change in TDS can cause toxicity through increases in salinity, changes in ionic composition, and toxicity of individual ions (Weber-Scannell and Duffy 2007). Coho salmon embryos were exposed to elevated TDS during different life stages and concluded that different life stages (post-fertilization to button-up fry) were unaffected by TDS exposure in the short and long-term (Stekoll *et al.* 2001). However, when coho were exposed to TDS during fertilization, higher TDS concentrations reduced hatch rates, delayed hatching, and reduced growth and development of fry. Eggs exposed to TDS concentrations of 1,875-2,500 mg/L had high mortality rates. A change in TDS concentrations from the discharge effluent will affect juvenile rearing and juvenile and adult migration life stages. It will not affect fertilization or egg development because it is located within the estuary where fertilization does not occur. In addition, TDS concentrations from the discharge effluent will average 40-60 mg/L daily, far below any harmful levels. We are certain the increase in TDS concentrations will not affect coho salmon in the action area.

<u>pH.</u> Under laboratory conditions, coho salmon tolerate a pH range of 6.1 to 8.2 (Dahlberg *et al.* 1968). If pH levels are greater than 8.5 the behavior of coho salmon will start to become affected, reproductive capability will begin to be impaired, and the viability of eggs, alevins, and fry will be reduced (Chambers et al. 2012). Lethal levels for pH occur below 5 or above 9 (European Inland Fisheries Advisory Commission 1969). The WTP will maintain pH of the discharge between 6.0 and 9.0 as required by the NPDES 200-J permit. The pH values for South Beaver Creek, a tributary of Beaver Creek upstream of the action area averaged 6.44 pH with a

range of 5.77-7.63 pH units (Mader and Bedford 2018).We do not anticipate pH to reach levels that would begin to have behavioral and reproductive impacts because the baseline conditions are below what coho salmon can tolerate and the 30:1 dilution ratio will minimize any influence the effluent has on Beaver Creek. Therefore, effluent pH is unlikely to be outside the range required for the lowest threshold of effect documented above.

Temperature. As described above (*See water quality- outfall effluent*), with the small amount of discharge, even at a low flow event, any warmer water that warmed up during the backwash basin retention time of 3-5 days will likely dissipate quickly and would not have an additional impact on water temperature in Beaver Creek.

Stormwater

A total of 1.94 acres of new impervious surface will be created by this proposed action. Stormwater contaminants will be conveyed off-site and will infiltrate through replanted vegetation. Traffic volumes (one vehicle per day) is very low and the corresponding pollutant load is expected to be relatively low.

Stormwater pollutants are a source of potent adverse effects to coho salmon, even at ambient levels (Loge *et al*. 2006, Hecht *et al*. 2007, Johnson *et al*. 2007, Sandahl *et al*. 2007, Spromberg and Meador 2006). These pollutants also accumulate in the prey and tissues of juvenile salmon where, depending on the level of exposure, they cause a variety of lethal and sublethal effects including disrupted behavior, reduced olfactory function, immune suppression, reduced growth, disrupted smoltification, hormone disruption, disrupted reproduction, cellular damage, and physical and developmental abnormalities (Fresh *et al*. 2005, Hecht *et al.* 2007). Aquatic contaminants often travel long distances in solution or attached to suspended sediments, or gather in sediments until they are mobilized and transported by the next high flow (Anderson *et al*. 1996, Alpers *et al.* 2000a and 2000b).

Because the stormwater is being infiltrated through reseeded vegetation and not treated, some stormwater contaminants will discharge into Beaver Creek. However, the concentration of stormwater containments high enough for a duration long enough to result in behavior effects, injury, or death are unlikely because of the very low traffic load and corresponding pollutant load of one vehicle a day.

Chemical Contaminants

As explained in the effects on critical habitat section, proposed project design criteria will minimize the probability and extent of unintentional chemical contamination, such that an accidental spill is extremely unlikely to occur. It is reasonable to expect a few drops (up to an ounce) of contaminants to drip from equipment onto the streambed in the isolation area and adjacent riparian area. The concentrations of contaminants in the river from such an occurrence will be immeasurable and undetectable because of the low volume of contaminants and the best management practices described in the proposed action. The resulting effects on OC coho salmon from these small drips, leaks or spills will be so mild that meaningful measurement, detection, or evaluation are not possible.

Work Area Isolation

Work area isolation to install the intake and the outfall is expected to occur during the preferred in-water work window of July 1-September 30. Construction of the water intake will take 5 weeks to complete in which 250 ft^2 of stream area will be isolated. Construction of the water outfall will take one day to complete and 100 ft^2 of stream will be isolated for that period.

To reduce direct effects of the construction, they will place cofferdams, salvage fish, and remove the dams following construction. Temporary placement of cofferdams over the existing streambed could compact streambed gravels where present, reducing infiltration and diversity of benthic habitat. Effects of the substrate compaction on OC coho salmon will be in a relatively small area for 5 weeks, less than one quarter of the active channel width. The cofferdams temporarily reduce invertebrate production from approximately 350 ft^2 (intake and outfall isolation) of streambed and invertebrates from upstream will rapidly re-colonize the affected area once flows return. During the work seasons, fish may move around the isolated area into deeper water. Additionally, during placement and removal of the cofferdams, there will be a short-term increase in turbidity and sedimentation downstream.

Capture and handling of juvenile OC coho salmon will occur after the cofferdam is in place. To estimate the number of juveniles expected to be present during fish salvage operations we used the best available science with juvenile coho salmon counts on Beaver Creek from 1998-1999 (Garono and Brophy 2001). During the Mid-Coast 6^{th} Field HUC Watershed Assessment 0.2 coho juveniles per square meter were identified in 26 pools surveyed in the mainstem of Beaver Creek. By using 0.2 juveniles per square meter as our base metric we applied it to the area being isolated for both the water intake and the water outfall. We conclude that 5 juvenile coho are likely to be present during fish operations of the water intake and 2 juvenile coho salmon are likely to be present at the outfall for a total of 7 juvenile coho salmon.

Additional Mitigation Actions

Additional mitigation measures described in the proposed action and analyzed above (see additional mitigation actions) are likely to have net beneficial effects, but given associated uncertainties those effects have not been considered in our analysis or conclusions.

Summary of effects on species

The slight change in depth and habitat at stream margins from reduced water volume and elevation will affect a maximum conservative amount of 84 juvenile OC coho salmon which equates to less than one adult OC coho salmon during a one-time low flow scenario year. Water withdrawal is not anticipated to meaningfully increase water temperatures or decrease dissolved oxygen within Beaver Creek or result in increased stress levels of rearing juvenile OC coho salmon. However, dissolved oxygen and temperature will be monitored and modeled.

Two suspended sediment plumes will be created by construction activities, harming a small number of rearing juveniles. The effects from construction-related chemical spills, stormwater runoff, and backwash effluent are too small or too unlikely to have meaningful consequences with the application of best management practices, complying with ODEQ's 200-J Filter Backwash General Permit, and allowing stormwater to infiltrate on-site before discharging into Beaver Creek.

We are reasonably certain that capture and handling with a potential of injury or death will occur to OC coho salmon juveniles from work area isolation. We determined that isolation activities will affect approximately 7 OC coho salmon juveniles in the lower Beaver Creek.

The lower Beaver Creek is important to the migration route for the Beaver Creek population of OC coho salmon. The proposed action will not meaningfully affect migration. The lower Beaver Creek is also used for juvenile rearing. Only a small percentage of the juvenile population uses the lower Beaver Creek reach during the summer months when temperature and DO could affect individual juvenile OC coho salmon. The number of individuals affected by the proposed action (84 + 7 from work area isolation = 91) equivalent to less than one adult OC coho salmon is very small compared to the overall population such that changes to population-level characteristics such as spatial structure, diversity, abundance, and productivity will not occur.

Additional mitigation measures described in the proposed action and analyzed above (see additional mitigation actions) are likely to have net beneficial effects, but given associated uncertainties those effects have not been considered in our analysis or conclusions.
With regard to the Siletz River coho population, it is difficult to determine with any accuracy if the additional instream water of 2 cfs will improve water quantity and provide additional habitat value for fish and so for the purposes of this consultation we have assumed no positive impact on OC coho.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

Key limiting stresses identified in the OC coho salmon Recovery Plan for the Beaver Creek population on the mainstem includes limited spawning gravel and stream complexity. Two key strategies identified in the Recovery Plan for the Beaver population included the development of water conservation strategies for municipal and irrigation water withdrawals to improve water temperature and DO levels sufficient for salmonid rearing and spawning and to improve water quality by improving stream shade, and substrate retention (NMFS 2016). A restoration and management plan has been developed for the lower Beaver Creek watershed with the goal of prioritizing conservation needs and promoting acquisition and restoration projects that address critical watershed restoration issues (Wetlands Conservancy 2008).

Cumulative effects include the continuation of all non-Federal water diversions. Effects from non-Federal water diversions likely increase through the irrigation (April 1 to October 15) as irrigation water demand increases while in-stream flow decreases. All water rights within the watershed equal a total of 2.2 cfs for irrigation and domestic uses.[3] We were unable to identify other future non-Federal actions reasonably certain to occur that would affect the action area, primarily because the action area is managed by Wetlands Conservancy as an aquatic wildlife corridor (OPRD 2014). The aquatic wildlife corridor is defined as a low disturbed corridor for both terrestrial and aquatic species with an optimal corridor width of 300 feet. However, this does not prevent activities on private lands adjacent to the action area or limit them upstream and these are expected to have somewhat similar impacts as are occurring now and reflected in the environmental baseline. Restoration efforts are also likely to continue within the watershed to minimize adverse effects from non-project related activities.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

Due to the strong influence of the coastal ocean on conditions of Oregon estuaries, rising sea level has the potential to mitigate warming water temperatures (Brown *et al.* 2016). With projected increased temperatures and decreased stream flows, sea level rise is projected to create future tidal wetlands in which the 2 cfs amount of water to be withdrawn is unlikely to be exacerbated by the effects of climate change. At 4.7 feet increase in sea level rise, the Beaver Creek estuary is projected to gain 240% of estuarine habitat (Brophy and Ewald 2017). Even at the lowest projected sea level rise of 0.8 feet, the Beaver Creek estuary is projected to gain 40% of estuarine habitat.

2.7.1 Critical Habitat

The baseline condition of critical habitat function and value in the watershed (Section 2.2) and in the action area (Section 2.4) has been impacted historically by logging, stream cleanout, agriculture, and valley bottom roads affecting the function and quality of habitat however, Beaver Creek has been ranked high for OC coho salmon rearing habitat due to the high amounts

[3] Oregon Water Resources Department, online water rights information query. Website: https://apps.wrd.state.or.us/apps/wr/wrinfo/wr_query.aspx

of large wood frequency, the length of available side channels, and connectivity to the floodplain (Garono and Brophy 2001). Actions identified in the Oregon Coast Coho Salmon Recovery Plan for Beaver Creek are to develop water conservation strategies for municipal and irrigation water withdrawals to improve water quality that is sufficient for salmonid rearing and spawning and to improve water quality by improving stream shade, and substrate retention.

PBFs that are likely to be limiting the conservation role of the critical habitat unit are floodplain connectivity, water quantity, water quality, forage, natural cover, salinity, and free of artificial obstruction. In the action area, these same PBFs are also of reduced quality for tidal freshwater migration, estuarine migration, tidal rearing, and non-tidal freshwater rearing. Although the quality and function of critical habitat has been reduced, it does provide support for OC coho salmon and the action area is a critical migration corridor.

The proposed action will result in short-term and long-term effects on floodplain connectivity, water quantity, water quality, forage, and natural cover PBFs. Short-term effects will temporarily effect the water quality, forage, and natural cover PBFs. Long-term effects will occur as a result from the withdrawal of 2 cfs affecting the floodplain connectivity, water quantity, and forage PBFs for rearing juvenile coho salmon however the amount of aquatic habitat being lost (0.3 acres) is small compared to the total amount of floodplain habitat available for rearing juvenile OC coho salmon resulting in a less than 1% loss in habitat. Water quality and natural cover PBF will also be minimally affected by long-term from stormwater pollutants and the outfall effluent. These effects will only occur in the mainstem Beaver Creek where critical habitat is protected and managed by the Wetlands Conservancy. The loss of habitat due to the water withdrawal is a 1% loss of the entire wetland marsh complex and only effects a small portion of the designated critical habitat. The small effect in the mainstem will not meaningfully change the conservation value on the critical habitat unit level.

In the Siletz basin, we have assumed that the additional 2 cfs, although an improvement for the Siletz basin, will have little to no positive impact on the Siletz River water quality and water quantity PBF.

As described in the cumulative effects section (2.6), we expect continuation of non-Federal water diversions and activities on private land adjacent to the action area but otherwise do not expect adverse impacts on critical habitat in the Beaver Creek action area as a result of cumulative effects because the action area is considered an aquatic wildlife corridor and is managed by Wetlands Conservancy.

Based on our analysis above, when considered in light of the status of the critical habitat, the effects of the proposed action, when added to the effects of the environmental baseline, and anticipated cumulative effects and climate change, the proposed action will not appreciably diminish the value of critical habitat for the conservation of the species at the critical habitat unit scale. Consequently, since the proposed action will not appreciably diminish the value of critical habitat for the conservation of the species at the critical habitat unit scale, it will not diminish the value of the critical habitat at the designation level and will retain its current ability to play the intended conservation role.

2.7.2 Listed Species

This ESU comprises 56 populations including 21 independent and 35 dependent populations. The last status review indicated a moderate risk of extinction. At the ESU level, persistence and sustainability have increased for the OC coho salmon ESU in large part to management decisions (reduced harvest and hatchery releases) and favorable environmental variation (high marine survival) (NMFS 2016). However, OC coho salmon abundance is strongly correlated with marine survival rates and marine survival rates decreased for OC coho salmon in recent years (2015-2017). OC coho salmon in the action area are part of the Beaver Creek population identified as potentially-independent. The Beaver Creek population is a high persistent population influenced by periodic immigration from other populations. The Beaver Creek population has been predicted to be able to avoid small-population demographic risks (Wainwright *et al.* 2008). Their annual abundance varies considerably from year to year, with average spawner returns over the last 5 years of 6%, respectively, of their potential historical spawner abundance. The primary and secondary limiting factors are spawning gravel and stream complexity. The proposed action will not affect the primary and secondary limiting factors.

Climate change is likely to adversely affect the survival and recovery of OC coho salmon, though it may have beneficial effects in certain circumstances. The adverse effects are likely to include, but are not limited to, sea level rise, increased water temperatures, decreased stream flow, and other variations in quality and quantity of estuary and mainstem rearing and migration habitats. Beaver Creek is projected to gain estuarine habitat from sea level rise, therefore the withdrawal of 2 cfs is unlikely to exacerbate the effects of climate change.

The action area supports smolt rearing, adult and smolt migration, and the transition between freshwater and saltwater. The environmental baseline of the action area is degraded from human caused impacts, particularly logging and agriculture. Developments in and around the estuary, including construction of in-water infrastructure and channelization have altered forage and habitat value throughout the estuary. The action area has likely improved with on-going restoration efforts and by being managed by the Wetlands Conservancy.

The proposed action will harm or kill OC coho salmon by reduced growth, survival, and fitness resulting from reduced water quality and physical injury or death from fish salvage operations. We also expect some minor and/or short term impacts resulting from the outfall and intake structures, chemical contaminants, outfall effluent, stormwater, and loss of riparian vegetation that will not harm or kill OC coho salmon. Although these effects will occur to multiple life stages of OC coho salmon, the proposed action will have a larger effect on rearing juvenile OC coho salmon. Using the worst case scenario and measures taken to minimize the effects to fish, we are reasonably certain that the action will result in only a small number of OC coho salmon injured or killed during implementation of the proposed action and a few per year injured or killed due to long-term effects from water withdrawal with the exception of an extremely low flow year (<5 cfs) in which case up to 84 individuals during a one-time low flow scenario and 7 individuals from fish salvage operations may be harmed, injured, or killed which is the equivalent to less than one adult OC coho salmon.

As described in the cumulative effects section (2.6), we expect continuation of non-Federal water diversions and activities on private land adjacent to the action area but otherwise do not expect adverse impact on OC coho in the Beaver Creek action area as a result of cumulative effects because the action area is considered an aquatic wildlife corridor and is managed by Wetlands Conservancy.

As an indirect effect of the action, the OC coho salmon population in the Siletz River will benefit from an increase in instream flows however the small amount of 2 cfs will have little to no positive impact on the water quality PBF for the Siletz OC coho salmon population.

Adverse effects of the proposed action will injure or kill OC coho salmon in the action area. The small number of OC coho salmon injured or killed will not be meaningful at the population level. When we add the effects of the proposed action to the populations' statuses, environmental baseline, cumulative effects, and climate change, we find the proposed action will not appreciably reduce the likelihood of the survival or recovery of OC coho salmon at the population scale. Based on our conclusion that the Beaver Creek population's survival and recover will not be impeded because of the proposed action, the proposed action will not appreciably reduce the likelihood of the survival or recovery of the OC coho salmon ESU.

Within the Siletz Basin, the additional 2 cfs, although an improvement, will have little to no positive impact on the Siletz River coho population or the ESU.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of OC coho salmon or destroy or adversely modify its designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is interpreted as to create the likelihood of injury to wildlife by annoying it to such extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.[4] "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency

[4] Donna S. Wieting memorandum to Regional Administrators dated October 21, 2016. NMFS Procedural Instruction 02-110-19, Interim Guidance on the Endangered Species Act Term "Harass" (December 21, 2016).

action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur because some of these individuals will be harmed or killed by work area isolation and habitat modification. In this biological opinion, NMFS determined that incidental take is reasonably certain to occur for the following life history stages of OC coho salmon:

1. Harm to rearing juveniles or smolts due to temporary increases in suspended sediment of up to 120 feet at the outfall structure and 150 feet at the intake structure during construction and removal of work area isolation structure.

2. Capture, harm, or kill 7 OC coho salmon juveniles, including smolts, due to work area isolation of approximately 350 ft^2 (100 ft^2 at the outfall structure and 250 ft^2 at the intake structure).

3. Harm from impairing juvenile OC coho salmon critical habitat from the water withdrawal of 2 cfs during low flow events that results in a maximum habitat loss of 13,099 ft^2 (0.3 acres).

Suspended Sediment Plumes

Although we were able to estimate a maximum number of juvenile OC coho salmon that would be affected by the action we cannot accurately quantify a number fish harmed or killed by suspended sediment because it is not feasible in practice without causing additional stress and injury. Furthermore, take caused by the habitat-related effects of this proposed action cannot be accurately quantified as a number of fish because the distribution and abundance of fish that occur within the action area are affected by habitat quality, competition, predation, amongst others. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can we precisely predict the number of fish that are reasonably certain to be harmed from suspended sediment. The best available indicator for the extent of take caused by suspended sediment plumes is the distance of visible suspended sediment increase. This variable has a causal link to the amount of harm because the distance of visible increased suspended sediment is proportional to its size and concentration of the disturbance which in turn reflects the amount of take that will occur. The extent of take will be exceeded if the work generates a turbidity plume large enough to be visible above background levels (about a 10% increase in natural stream turbidity) greater than 120 feet downstream from the outfall structure and 150 feet downstream from the intake structure isolation areas.

Work Area Isolation

It is practicable to quantify and measure the number of individuals subject to incidental take caused by work area isolation. As described in Section 2.5, we are reasonably certain that capture and handling resulting in injury or death will occur to a total of 7 OC coho salmon juveniles and smolts from work area isolation activities in Beaver Creek (2 OC coho salmon from the outfall structure isolation area and 5 OC coho salmon from the intake structure isolation area). If more than 2 juvenile/smolt OC coho salmon are captured during the outfall structure work area isolation the amount of take will be exceeded and the reinitiation provisions of this opinion will be triggered. Additionally, if more than 5 juvenile/smolt OC coho salmon are captured during the intake structure work area isolation the amount of take will be exceeded and the reinitiation provisions of this opinion will be triggered.

Harm from Impairing Floodplain Habitat

Based on our analysis, we concluded that the loss of floodplain habitat would equate to a maximum estimated amount of 84 juvenile OC coho salmon which equals less than one adult OC coho salmon. However, take caused by the habitat-related effects of this proposed action cannot be accurately quantified as a number of fish because the distribution and abundance of fish that occur within the action area are affected by habitat quality, competition, predation, amongst others. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can we precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded. Additionally, there is no practical way to count the number of fish affected without causing additional stress and injury. In such circumstances, we use the causal link established between the activity and the likely changes in habitat conditions affecting the listed species to describe the extent of take as a numerical level of habitat disturbance.

The best available indicator for the extent of take caused by water withdrawal is the resulting worst case scenario low flow of 3.92 cfs. In our analysis, we used the worst case scenario of withdrawing 2 cfs from the lowest recorded streamflow of 5.92 cfs. Within this opinion the effects of water withdrawal were analyzed to the low stream flow condition of 3.92 cfs. Any stream flow that is less than 3.92 cfs has not been analyzed in this opinion and therefore serves as a reinitiation trigger. This variable has a causal link to the amount of harm because it translates into reduced stream discharge and the relationship between reduced stream discharge and loss of critical habitat. The extent of take will be exceeded if the average 7-day flow is below 3.92 cfs. The average 7-day flow is used as the extent of take because it is a conservative metric that can be continuously measured without any current history or extrapolation of flow data (i.e. exceedance level).

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Minimize incidental take of juvenile and smolt OC coho salmon from exposure to elevated suspended sediment.
2. Minimize incidental take of juvenile and smolt OC coho salmon from trapping and capture associated with work area isolation.
3. Minimize incidental take of juvenile OC coho salmon from the reduction in habitat caused by water withdrawal.
4. Complete monitoring and reporting to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the USDA-RUS or any applicant, as specified, must comply with them in order to implement the RPMs (50 CFR 402.14). The USDA-RUS or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1 (elevated suspended sediment).
    a. As a funding condition the USDA-RUS will require the District to monitor distance of suspended sediment plumes throughout the in-water work of the project. If the project exceeds a visible continuous sediment plume large enough to be visible above background levels (about a 10% increase in natural stream turbidity) of 120 feet downstream of the outfall structure isolated work area or 150 feet downstream of the intake structure isolated work area, all work resulting in elevated suspended sediment must stop until the plume dissipates to match baseline conditions.

2. The following terms and conditions implement reasonable and prudent measure 2 (trapping and capture associated with work area isolation).
    a. As a funding condition the USDA-RUS will require the District, when concluding work area isolation and fish capture activities, to follow the ordering, methodologies, and project design criteria specified below, to minimize harm.

i. If practicable, allow OC coho salmon to migrate out of the work area or remove fish before dewatering; otherwise remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets or seining.
ii. A qualified fisheries biologist, with experience in work area isolation and competent to ensure the safe handling of all fish, will supervise the work area isolation.
iii. If a pump is used to dewater the isolation area and OC coho salmon may be present, a fish screen will be used that meets the most current version of NMFS's fish screen criteria (NMFS 2011). The NMFS verification is required for pumping at a rate that exceeds 3 cfs. Monitor below the construction site to prevent stranding of aquatic organisms during dewatering.
iv. Use nets with a mesh of the appropriate size to ensure capture of OC coho salmon juveniles.
v. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of fish.
vi. Electrofishing will be used during the coolest time of day, only after other means of fish capture are determined not feasible or ineffective, and will be carried out as follows:
    1. Never electrofish when the water appears turbid so that objects are not visible at depth of 12 inches or when water temperatures are above 18ºC, or are expected to rise above 18ºC before concluding the fish capture activity.
    2. Do not intentionally contact fish with the anode.
    3. Follow NMFS (2000) electrofishing guidelines, including use of only direct current or pulsed direct current within the following ranges:
        a. If conductivity is less than 100 MicroSiemens (μs), use 900 to 1100 volts.
        b. If conductivity is between 100 and 300 μs, use 500 to 800 volts.
        c. If conductivity greater than 300 μs, use less than 400 volts.
    4. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.
    5. Immediately discontinue electrofishing if fish are killed or injured, *i.e.*, dark bands visible on the body, spinal deformations, significant de-scaling, torpid or inability to maintain upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.
vii. If buckets are used to transport fish:
    1. Minimize the time fish are in a transport bucket.

2. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.
3. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.
4. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.
5. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.
6. Record the number of captured adult and juvenile OC coho salmon separately. Document all fish injuries and mortalities.

3. The following terms and conditions implement reasonable and prudent measure 3 (floodplain habitat loss from water withdrawal).
    a. Streamflow shall be monitored by the District at the intake location when withdrawing water during the summer months of June 1 to October 31 when low flows are expected to occur.
    b. Streamflow shall be measured by the District by a continuous stream gage preferably following USGS stream gage protocols.
    c. The average 7-day stream flow shall be reported annually by the District to NMFS in perpetuity.
        i. Send all reports to:

            Assistant Regional Administrator
            Oregon Washington Coastal Area Office
            National Marine Fisheries Service
            Attn: **WCRO-2018-00045**
            1201 NE Lloyd Boulevard, Suite 100
            Portland, Oregon 97232-1274

4. The following terms and conditions implement reasonable and prudent measure 4 (monitoring & reporting).
    a. The USDA-RUS shall submit the following reports to NMFS, at the address provided below:
        i. Project completion report. The USDA-RUS shall submit a project completion report within 90 days of completing construction with the following information.
            1. Project name.
            2. USDA-RUS contact person.
            3. Start and end dates for in-stream work.
            4. Summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
            5. Photos of habitat conditions before, during, and after action completion.
        ii. Fish salvage report. The USDA-RUS shall submit a fish salvage report within 90 days of completing a fish capture and release event with the

following information. If the amount of take is exceeded than USDA-RUS shall report immediately to NMFS that take was exceeded.

1. Date(s) of fish salvage operation and time(s) of day.
2. Water temperature.
3. Air temperature.
4. Means of fish capture.
5. Number of fish captured by species and by adult/juvenile for OC coho salmon.
6. Release site and condition of all fish released.
7. Any incidence of observed injury or mortality of OC coho salmon by life history stage.
8. Evidence of compliance with NMFS fish screen criteria for any pump used.

b. Send all reports to:

Assistant Regional Administrator
Oregon Washington Coastal Area Office
National Marine Fisheries Service
Attn: **WCRO-2018-00045**
1201 NE Lloyd Boulevard, Suite 100
Portland, Oregon 97232-1274

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. We recommend that the USDA-RUS include a grant condition that the Seal Rock Water District facilitate efforts to conserve and manage water resources within the action area by working with other water management entities in the Beaver Creek watershed to assist in the conservation and recovery of OC coho salmon.
2. We recommend that the USDA-RUS include a grant condition that the Seal Rock Water District implement additional stormwater low-impact design elements into the construction of the electrical building and WTP by managing stormwater runoff from the roof surfaces. Examples include but are not limited to the use of disconnected downspouts to redirect roof runoff pollutants to an area where the water can infiltrate into amended soils or adding contained planter boxes where the roof runoff pollutants can infiltrate through the soil and plant medium.

Please notify us if the USDA-RUS carries out these recommendations so we will be kept informed of actions that minimize or avoid adverse effects and those that benefit the listed species or their designated critical habitats.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Beaver Creek Raw Water Supply Intake Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the USDA-RUS and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and the action area for this consultation are described in the Introduction to this document (Sections 1.3 and 2.3). The action area includes areas designated as EFH for Pacific coast salmon. Estuarine habitat has been identified by the PFMC as habitat areas of particular concern (HAPC). The action area is in an area where environmental effects of the proposed project would likely adversely affect EFH and HAPC for Pacific salmon. While the HAPC designation does not add any specific regulatory process, it does highlight certain habitat types that are of high ecological importance (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

The ESA portion of this document (Section 2.5) describes the adverse effects of this proposed action on OC coho salmon. This ESA analysis of effects is also relevant to Pacific Coast salmon EFH. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, we conclude that the proposed action will have the following adverse effects on EFH designated for Pacific Coast salmon, including the estuary habitat HAPC:

1. Small and temporary increases in suspended sediment concentrations.
2. Long-term reduction in water quantity of estuarine HAPC.

3.3 Essential Fish Habitat Conservation Recommendations

The following three conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. All of these conservation recommendations are a subset of the ESA terms and conditions.

1. Coordinate timing of in-water work with ODFW to minimize exacerbating adverse effects on Pacific Salmon EFH. Monitor distance of suspended sediment plumes throughout the in-water work of the project to minimize adverse effects on water quality, including the estuary habitat HAPC as stated in term and condition #1 in the accompanying opinion.

2. Monitor and report stream flow at the intake location as stated in term and condition #3.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, approximately 15.8 acres of designated EFH for Pacific Coast salmon.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, USDA-RUS must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The USDA-RUS must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are USDA-RUS. Other interested users could include the Seal Rock Water District or others interested in the conservation of the affected ESU. Individual copies of this opinion were provided to the USDA-RUS. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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