UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No: WCRO-2022-01268

January 11, 2023

Todd Tillinger
U.S. Army Corps of Engineers
Seattle District East Marginal Way South, BLDG 1202
Seattle, Washington 98134-2388

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Snake River Orchard Pump Station Improvements, Snake River, HUC 17060110, Walla Walla County, Washington

Dear Mr. Tillinger:

Thank you for your letter of March 16, 2022, requesting initiation of consultation with National Oceanic and Atmospheric Administration (NOAAs) 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 Snake River Orchard Pump Station Improvement Project.

NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act [16 U.S.C. 1855(b)], and concluded that the action would adversely affect the EFH of salmon managed under the Pacific Coast Salmon Fishery Management Plan. Therefore, we have included the results of that review in Section 3 of this document.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 Code of Federal Regulations (CFR) part 402 in 2019 ("2019 Regulations," see 84 Federal Register (FR) 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion (opinion) and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

In this opinion, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River (SR) fall-run Chinook salmon (*Oncorhynchus tshawytscha*), SR spring/summer Chinook salmon (*O. tshawytscha)*, SR sockeye salmon (*O. nerka*), and Snake River Basin (SRB) steelhead (*O. mykiss*). NMFS also determined the action will not destroy or adversely modify designated critical habitat for these four species. Rationale for our conclusions is provided in the attached opinion.

As required by section 7 of the ESA, NMFS provides an incidental take statement (ITS) with the opinion. The ITS describes reasonable and prudent measures (RPM) NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth terms and conditions, including reporting requirements, which the U.S. Army Corps of Engineers (COE) must comply with in order to be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's effects on EFH pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA), and includes one Conservation Recommendation to avoid, minimize, or otherwise offset potential adverse effects on EFH. The Conservation Recommendation is identical to the ESA 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 Recommendation, the COE must explain why the recommendations will not be followed, including the 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, in your statutory reply to the EFH portion of this consultation, NMFS asks that you clearly identify the number of Conservation Recommendations accepted.

You may contact Todd Andersen, Snake Basin Office, (208) 366-9586, todd.andersen@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Nancy L Munn

Nancy L. Munn
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Enclosure

cc: David Moore - COE
Mike Lopez – NPT
Gary James – CTUIR
Christine Ford – USFWS

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

Snake River Orchard Pump Station Improvements

NMFS Consultation Number: WCRO-2022-01268

Action Agency: U.S. Army Corps of Engineers

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?
Snake River Basin steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No
Snake River spring/summer Chinook salmon (*O. tshawytscha)*	Threatened	Yes	No	Yes	No
Snake River fall-run Chinook salmon (*O. tshawytscha)*	Threatened	Yes	No	Yes	No
Snake River sockeye salmon (*O. nerka*)	Endangered	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: Nancy L Munn

Nancy L. Munn
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Date: January 11, 2023

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

ACRONYMS

BA	Biological Assessment
BMP	Best Management Practices
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
COE	U.S. Army Corps of Engineers
dB	Decibels
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
HAPC	Habitat Area of Particular Concern
FR	Federal Register
ICTRT	Interior Columbia Technical Recovery Team
ISAB	Independent Scientific Advisory Board
ITS	Incidental Take Statement
LAA	Likely to Adversely Affect
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OHWM	Ordinary High-Water Mark
opinion	Biological Opinion
PBF	Physical or Biological Feature
PCE	Primary Constituent Element
PFMC	Pacific Fishery Management Council
RM	River Mile
RPM	Reasonable and Prudent Measure
SR	Salmon River
SRB	Salmon River Basin
U.S.C.	U.S. Code
USGCRP	U.S. Global Change Research Program
VSP	Viable Salmonid Population
WDOE	Washington Department of Ecology

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

NMFS prepared the opinion and ITS portions of this document in accordance with section 7(b) of the ESA of 1973 (16 U.S.C. 1531 et seq.), as amended, 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 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). The document will be available within 2 weeks at NOAA's Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the Interior Columbia Basin Office, Boise, Idaho.

1.2. Consultation History

On March 16, 2022, NMFS received a letter requesting informal consultation from the COE for the Snake River Orchard Pump Station Improvements Project. The COE also submitted a Biological Assessment (BA) (J-U-B-Engineers 2022) to support their determinations for the species and critical habitat listed under ESA. After reviewing the BA, NMFS and U.S. Fish and Wildlife service submitted questions to the COE project manager for clarification on some project components. Additionally, information acquired after the initial BA was submitted indicated that dredging would be required to effectively install and operate the new pump screens. On April 19, 2022, NMFS received a revised BA to reflect that dredging would occur.

The revised BA concluded that the proposed action is not likely to adversely affect SRB steelhead (*Oncorhynchus mykiss*), SR spring/summer Chinook salmon (*O. tshawytscha*), SR fall Chinook salmon, and SR sockeye salmon (*O. nerka*), designated critical habitat for all four species, and essential fish habitat (EFH) for Chinook and coho salmon (*O.kisutch*). Due to the effects of the dredging, sheet pile driving, and operation of the screened pumps, NMFS determined that the action would be Likely to Adversely Affect (LAA) all four species, their critical habitat, and EFH for Chinook and coho salmon. The COE project manager concurred with the LAA determination in a May 15, 2022 email. Formal consultation was then initiated on May 19, 2022 after the COE clarified that dredging would be implemented using a shore-based excavator.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02).

The Snake River Orchard is proposing to rehabilitate an existing pump station located along the east bank of the Snake River, just upstream from Ice Harbor Dam and downstream from Charbonneau Park, near river mile (RM) 10.8 (Figure 1). The proposed work will replace the Snake River Orchard's existing intake screens, concrete sump deck, electrical equipment and buildings, pumps and motors, and piping equipment.

The existing pump station was constructed around 1970, and the site has been used as an irrigation water pump station since that time. The river at this location is about 3,500 feet wide and the navigation channel lies approximately 1,600 feet west of the pump station location. The work location is along the shoreline and, given its proximity to the forebay pool of Ice Harbor dam, water velocity at the site is low. The substrate present at the site is currently silt, sand, and gravel; no large woody debris or aquatic vegetation is present.

There are three pump stations located at the site, immediately adjacent to each other. The Snake River Orchard pump station is the most westerly. There are also four electrical buildings and a Columbia Rural Electric Association electrical substation on the site. Snake River Orchard has three river withdrawal pumps and six booster pumps at the site, with a separate electrical building for each set of pumps. The Snake River Orchard buildings, pumping and electrical equipment are approaching 50 years old and need replacement. The adjacent two pump stations are not owned by Snake River Orchard; they have been recently replaced and are in good condition.

The three river withdrawal pumps sit on a concrete deck over a sump connected to the river, which is supported by steel structural supports. The steel supports are very badly corroded and show signs of failing. The electrical equipment was manufactured in 1969 and replacement parts are no longer available, and the buildings housing the equipment are also in poor condition. The existing intake screens are vertical frames with woven wire over them that frequently get plugged and are difficult to clean. The existing intake screens do not meet current NMFS requirements.

This project will involve the installation of two new mechanically cleaned intake screens on the river side of an existing concrete pump sump and screen headwall at Snake River Orchards river pump station (Figure 2). Two 42-inch diameter steel pipes will be installed through the existing concrete pump sump to new onshore vertical pump wells (Figure 3). The existing concrete deck over the pump station will be replaced following installation of the pipes.

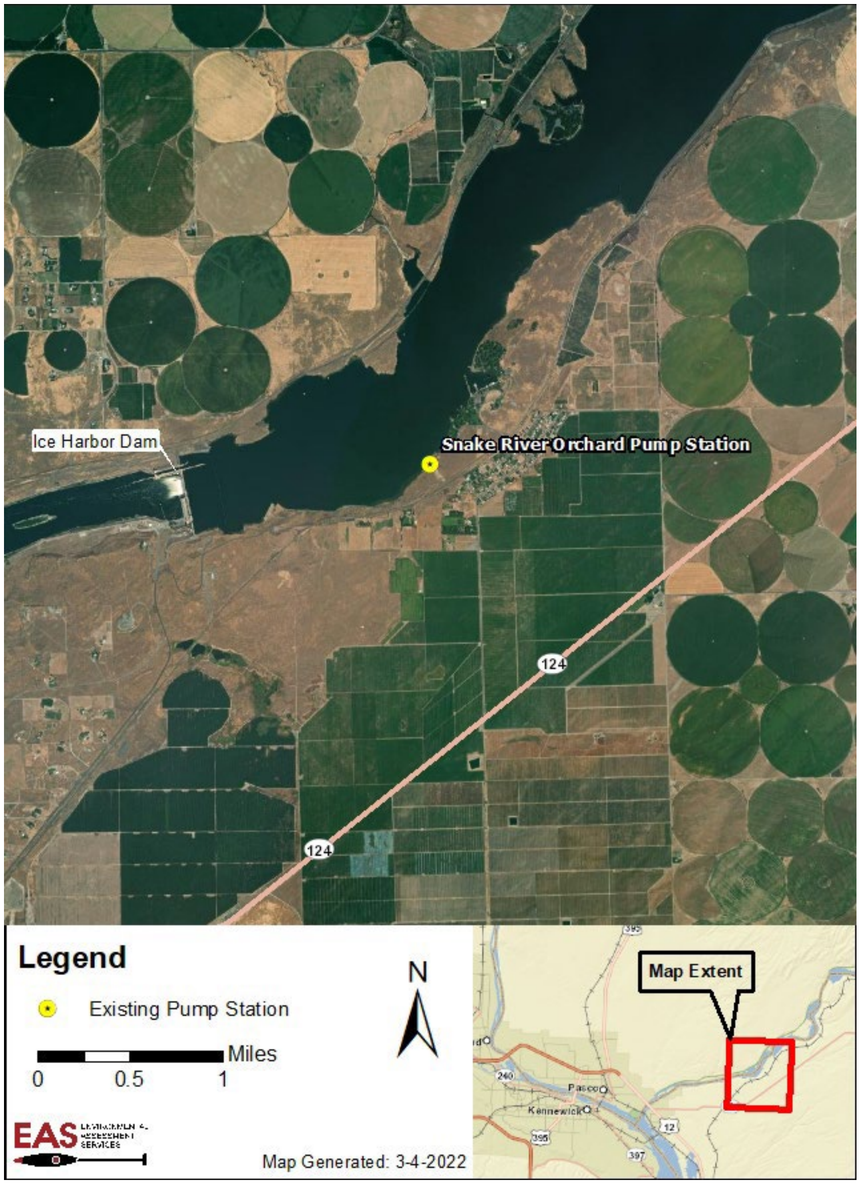

Figure 1. Location of the Snake River Orchard Pump Station Improvement Project in the Ice Harbor pool, Snake River, Washington.

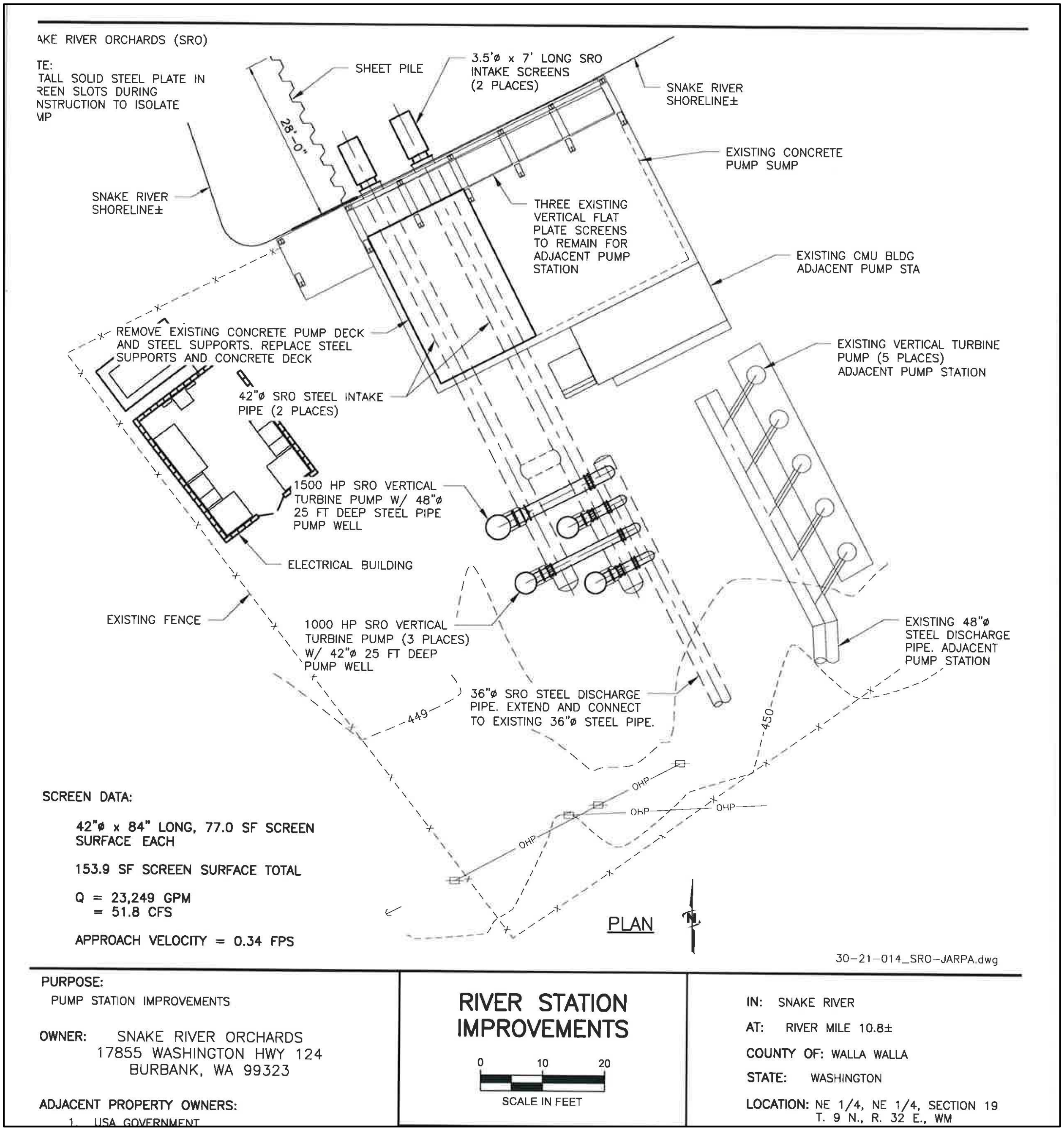

Figure 2. Engineering drawing for the plan view of the pump station improvements for the Snake River Orchard pumping station.

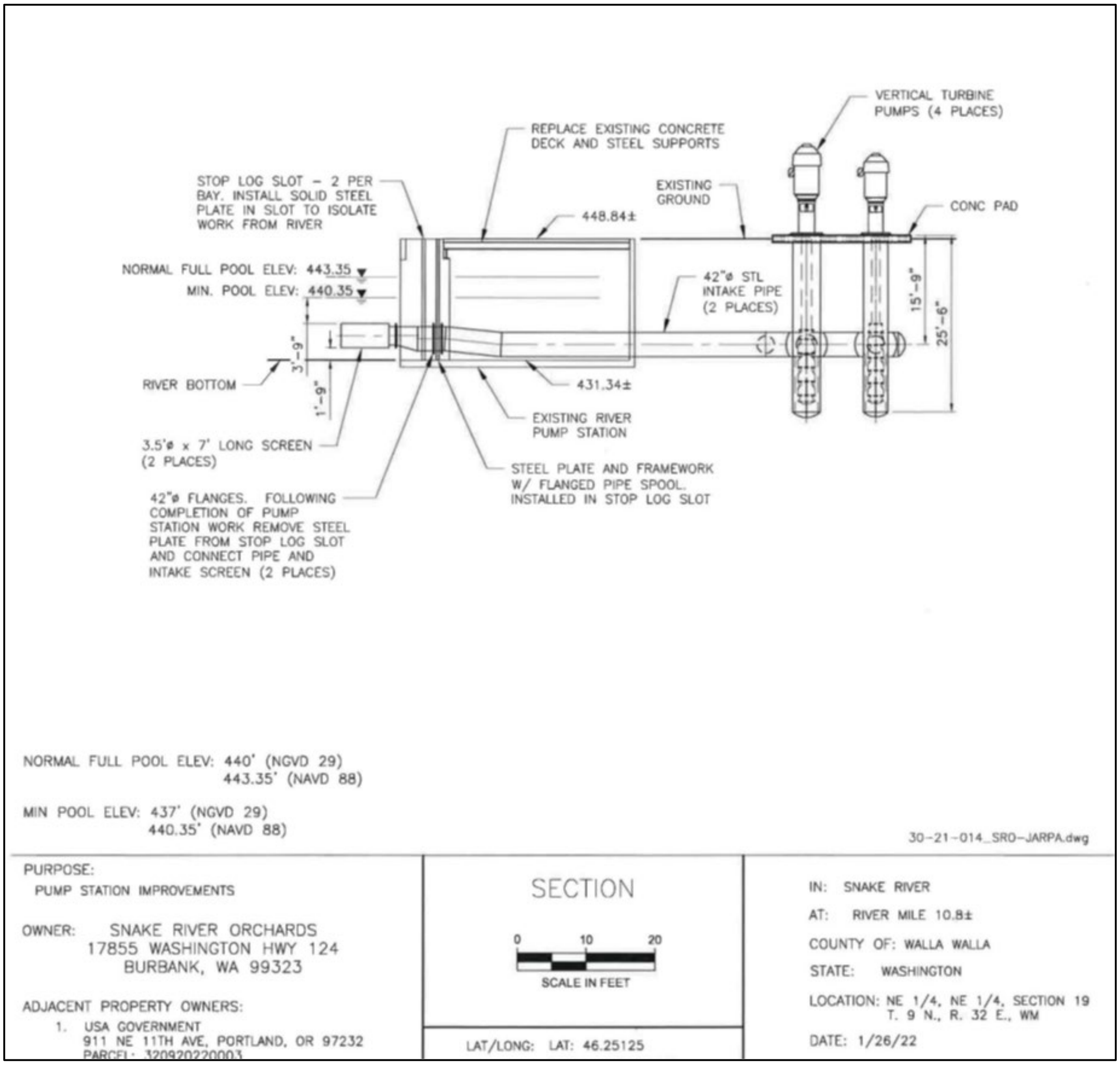

Figure 3. Engineered drawing of the improved intake station at Snake River Orchards.

The existing concrete pump sump inlet structure has multiple screen bays, which each have two sets of vertical slots. Each screen bay contains an intake screen located in one of the vertical slots. These screens will be removed and solid steel plates will be installed in each of the screen bays to isolate the river from the existing concrete pump sump and onshore work. While the existing concrete pump sump is isolated the following work will be performed:

- The existing concrete deck located over the pump sump will be removed along with the steel structural members that support it.
- Holes will be cut in the southerly walls of the existing concrete pump sump to allow new pipe installation.
- Two new 42-inch steel pipes that will extend from the two most westerly screen bays through the existing concrete pump sump will be installed.

- Each of the new 42-inch steel pipes will include a solid steel plate collar that can be dropped into the shoreward vertical slot to seal off the pump sump from the river when the steel plates installed into the screen bays are removed from the outer vertical slot.
- New steel structural members will be installed to replace those that were removed with the concrete deck.
- The southerly concrete sump wall will be repaired.
- The concrete deck over the pump sump will be replaced.

On the landward side of the existing pump station, new vertical steel pipe pump cans, pumps and motors, and discharge piping will be installed along with a new electrical building and new electrical equipment.

Prior to initiating any in-water work, an impermeable turbidity curtain will be installed across the mouth of the inlet channel to retain any turbid water in the inlet channel while work is being performed (Figure 4). In order to haze fish out of the area, the curtain will be deployed along the face of the pump structure to a depth just above the river bottom. Using shore-based heavy equipment (e.g., excavators), the curtain will then be dragged out towards the river approximately 55 feet in a manner to maintain a depth just above, but not dragging, along the river bottom. Approximately 0.12 acres of the inlet channel will be isolated by the turbidity curtain. The curtain will remain in place for approximately 60 days in January and February until the project is complete.

Approximately 28 feet of Z sheet pile will be driven to retain the bank in the pump station inlet channel adjacent to the new intake screens. The pile will be driven in the existing inlet channel, which will be separated from the river by the turbidity curtain during the work. The Z pile will be driven with shore-based equipment, either a crane or excavator with a vibratory hammer. Below the bottom sediment, bore holes drilled on shore suggest the pile will encounter silty gravels or silty sands down to an elevation of approximately 431 ft. This elevation coincides with the existing concrete pump sump floor elevation. Below this elevation, the onshore bore holes suggest the pile will encounter poorly graded gravels. The pile will be driven into the poorly graded gravel to a depth of 8 to 10 ft. The overall height of the pile planned for installation is approximately 20 ft. The volume of the sheet pile installed will be approximately 0.65 cubic yards. This aspect of the project is anticipated to take approximately 8 hours and will affect roughly 28 linear feet of the waterbody.

Figure 4. Approximate location where silt curtain will be deployed.

Approximately 37 cubic yards of material will need to be removed via dredging in the area where the screens will be installed (approximately 441 square feet). The dredging will be completed using a shore-based excavator and dump trucks. The material removed during the dredging will be disposed of at an upland location on the farm, away from the river and the project site. Dredging is expected to be completed in approximately four hours.

The final component of the project will be to install two new stainless-steel wedge wire mechanically cleaned screens by lowering them into the water and bolting them to the 42-inch diameter steel pipes. These intake screens will be rotating barrel screens with stainless steel wedge wire screen material and an automated brush cleaning system. They will have 0.069-inch slots and meet current NMFS requirements. Maximum velocity at the pumps is 0.34 feet per second.

When the two adjacent pump stations were reconstructed, significant groundwater was encountered. Some of the above listed work will take place in the water, while other work may require dewatering. Water from dewatering will be discharged into the inlet channel to the pump station once turbidity has reached background levels for the Snake River.

Following construction, the new intake screens will meet current NMFS standards and include an automated brush cleaning system, which will reduce the impact of the existing pump station on the aquatic environment.

Project Work Area and Schedule. Work for this project will be performed during the 2022/2023 winter season, beginning late December or early January and ending February 28, 2023. Prior to any in-water work, a silt curtain will be deployed in the inlet channel approximately 55 feet from the pump station. The silt curtain will remain in place until the project is complete (approximately 60 days). The majority of the work will be performed when the area is isolated from the river by using steel plates in the outer vertical slots to block the existing intakes. Groundwater was encountered when the other two pump stations on site were reconstructed. If work is performed in groundwater, the water will be discharged to the inlet channel for the pump station once turbidity has reached background levels of the Snake River. Near the end of the project, approximately 28 feet of Z sheet pile will be driven in to retain the riverbank in the pump station inlet channel. The pile will be driven with shore-based equipment. The final step of the project will be to dredge an area around the intake screens, before lowering two new stainless-steel wedge screens into the water and bolting them to the 42-inch diameter pipes. The silt curtain will be removed upon completion of the project.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. The action is a maintenance activity and is not expected to result in additional development or activities.

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 provide 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 RPMs and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably 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 opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designations of critical habitat for SR fall Chinook, SR spring/summer Chinook salmon, SR sockeye salmon, and SRB steelhead use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced these terms 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 opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion, we use the terms "effects" and "consequences" interchangeably.

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

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly 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; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative 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' "reproduction, numbers, or distribution" for the jeopardy analysis. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species. The Federal Register notices and notice dates for the species and critical habitat listings considered in this opinion are included in Table 1.

Table 1. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register decision notices for ESA-listed species considered in this opinion.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytcha*)			
Snake River spring/summer-run	T 4/22/92; 57 FR 14653	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Snake River fall-run	T 4/22/92; 57 FR 14653	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Sockeye salmon *(O. nerka)*			
Snake River	E 11/20/91; 56 FR 58619	12/28/93; 58 FR 68543	ESA section 9 applies
Steelhead (*O. mykiss*)			
Snake River Basin	T 8/18/97; 62 FR 43937	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Note: Listing status 'T' means listed as threatened under the ESA; 'E' means listed as endangered.
[1]The listing status for Snake River spring/summer Chinook salmon was corrected on 6/3/92 (57 FR 23458).

2.2.1. Status of the Species

This section describes the present condition of the SR spring/summer Chinook salmon, SR fall Chinook salmon, and SR sockeye salmon evolutionarily significant units (ESUs), and the SRB steelhead distinct population segment (DPS). NMFS expresses the status of a salmonid ESU or DPS in terms of likelihood of persistence over 100 years (or risk of extinction over 100 years). NMFS uses McElhany et al.'s (2000) description of a viable salmonid population (VSP) that defines "viable" as less than a 5 percent risk of extinction within 100 years and "highly viable" as less than a 1 percent risk of extinction within 100 years. A third category, "maintained," represents a less than 25 percent risk within 100 years (moderate risk of extinction). To be considered viable, an ESU or DPS should have multiple viable populations so that a single catastrophic event is less likely to cause the ESU/DPS to become extinct, and so that the ESU/DPS may function as a metapopulation that can sustain population-level extinction and recolonization processes of the Interior Columbia Technical Recovery Team (ICTRT 2007). The risk level of the ESU/DPS is built up from the aggregate risk levels of the individual populations and major population groups (MPGs) that make up the ESU/DPS.

Attributes associated with a VSP are: (1) abundance (number of adult spawners in natural production areas); (2) productivity (adult progeny per parent); (3) spatial structure; and (4) diversity. A VSP needs sufficient levels of these four population attributes in order to: safeguard the genetic diversity of the listed ESU or DPS; enhance its capacity to adapt to various environmental conditions; and allow it to become self-sustaining in the natural environment (ICTRT 2007). These viability attributes are influenced by survival, behavior, and experiences throughout the entire salmonid life cycle, characteristics that are influenced in turn by habitat and other environmental and anthropogenic conditions. The present risk faced by the ESU/DPS informs NMFS' determination of whether additional risk will appreciably reduce the likelihood that the ESU/DPS will survive or recover in the wild.

The following sections summarize the status and available information on the species and designated critical habitats considered in this opinion based on the detailed information provided by the ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon & Snake River Basin Steelhead (NMFS 2017a), ESA Recovery Plan for Snake River Fall Chinook Salmon (NMFS 2017b), ESA Recovery Plan for Snake River Sockeye Salmon (NMFS 2015), Biological

Viability Assessment Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Pacific Northwest (Ford 2022), 2022 5-Year Review: Summary & Evaluation of Snake River Spring/Summer Chinook Salmon (NMFS 2022a); 2022 5-Year Review: Summary & Evaluation of Snake River Basin Steelhead (NMFS 2022b); 2022 5-Year Review: Summary & Evaluation of Snake River Fall Chinook Salmon (NMFS 2022c); and 2022 5-Year Review: Summary & Evaluation of Snake River Sockeye Salmon (NMFS 2022d). These eight documents are incorporated by reference here.

2.2.1.1. Snake River Spring/Summer Chinook Salmon

The SR spring/summer Chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Large portions of historical habitat were blocked in 1901 by the construction of Swan Falls Dam, on the Snake River, and later by construction of the three-dam Hells Canyon Complex from 1955 to 1967. Dam construction also blocked and/or hindered fish access to historical habitat in the Clearwater River basin as a result of the construction of Lewiston Dam (removed in 1973 but believed to have caused the extirpation of native Chinook salmon in that subbasin). The loss of this historical habitat substantially reduced the spatial structure of this species. The production of SR spring/summer Chinook salmon was further affected by the development of the eight Federal dams and reservoirs in the mainstem lower Columbia/Snake River migration corridor between the late 1930s and early 1970s (NMFS 2017a).

Several factors led to NMFS' 1992 conclusion that SR spring/summer Chinook salmon were threatened: (1) abundance of naturally produced SR spring and summer Chinook runs had dropped to a small fraction of historical levels; (2) short-term projections were for a continued downward trend in abundance; (3) hydroelectric development on the Snake and Columbia Rivers continued to disrupt Chinook runs through altered flow regimes and impacts on estuarine habitats; and (4) habitat degradation and reduced streamflows existed throughout the region, along with risks associated with the use of outside hatchery stocks in particular areas (Good et al. 2005). NMFS completed its 5-year review for Pacific salmon and steelhead in 2022 and concluded the species should remain listed as threatened (NMFS 2022a).

Life History.
SR spring/summer Chinook salmon are characterized by their return times. Runs classified as spring Chinook salmon are counted at Bonneville Dam beginning in early March and ending the first week of June; summer runs are those Chinook salmon adults that pass Bonneville Dam from June through August. Returning adults will hold in deep mainstem and tributary pools until late summer, when they move up into tributary areas and spawn. In general, spring-run type Chinook salmon tend to spawn in higher-elevation reaches of major Snake River tributaries in mid- through late August, and summer-run Chinook salmon tend to spawn lower in Snake River tributaries in late August and September (although the spawning areas of the two runs may overlap).

Spring/summer Chinook spawn typically follow a "stream-type" life history characterized by rearing for a full year in the spawning habitat and migrating in early to mid-spring as age-1 smolts (Healey 1991). Eggs are deposited in late summer and early fall, incubate over the following winter, and hatch in late winter and early spring of the following year. Juveniles rear through the summer, and most overwinter and migrate to sea in the spring of their second year of life. Depending on the tributary and the specific habitat conditions, juveniles may migrate extensively from natal reaches into alternative summer-rearing or overwintering areas. Portions of some populations also exhibit "ocean-type" life history, migrating to the ocean during the spring of emergence (Connor et al. 2001; Copeland and Venditti 2009). Snake River spring/summer Chinook salmon return from the ocean to spawn primarily as 4- and 5-year-old fish, after 2 to 3 years in the ocean. A small fraction of the fish returns as 3-year-old "jacks," heavily predominated by males (Good et al. 2005).

Spatial Structure and Diversity.
The Snake River ESU includes all naturally spawning populations of spring/summer Chinook in the mainstem Snake River (below Hells Canyon Dam) and in the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins (57 FR 23458), as well as the progeny of 13 artificial propagation programs (85 FR 81822). The hatchery programs include the McCall Hatchery (South Fork Salmon River), South Fork Salmon River Eggbox, Johnson Creek, Pahsimeroi River, Yankee Fork Salmon River, Panther Creek, Sawtooth Hatchery, Tucannon River, Lostine River, Catherine Creek, Lookingglass Creek, Upper Grande Ronde River, and Imnaha River programs. The historical Snake River ESU also included populations in the Clearwater River drainage and extended above the Hells Canyon Dam complex.

Within the Snake River ESU, ICTRT identified 28 extant and 4 extirpated or functionally extirpated populations of spring/summer-run Chinook salmon, listed in Table 2 (ICTRT 2003; McClure et al. 2005). The ICTRT aggregated these populations into five MPGs: Lower Snake River, Grande Ronde/Imnaha Rivers, South Fork Salmon River, Middle Fork Salmon River, and Upper Salmon River. For each population, Table 2 shows the current risk ratings for the abundance/productivity and spatial structure/diversity VSP risk parameters.

Spatial structure risk is low to moderate for most populations in this ESU (Ford 2022) and is generally not preventing the recovery of the species. Spring/summer Chinook salmon spawners are distributed throughout the ESU albeit at very low numbers. Diversity risk, on the other hand, is somewhat higher, driving the moderate and high combined spatial structure/diversity risks shown in Table 2 for some populations. Several populations have a high proportion of hatchery-origin spawners—particularly in the Grande Ronde, Lower Snake, and South Fork Salmon MPGs—and diversity risk will need to be lowered in multiple populations in order for the ESU to recover (ICTRT 2007; ICTRT 2010; Ford 2022).

Table 2. Summary of viable salmonid population (VSP) parameter risks, current status, and proposed recovery goal for each population in the Snake River spring/summer Chinook salmon evolutionarily significant unit (Ford 2022; NMFS 2017a). Individuals from each population group may be exposed to effects of the action.

Major Population Group	Population	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[2]
South Fork Salmon River (Idaho)	Little Salmon River	*Insuf. data*	Low	High Risk	Maintained
	South Fork Salmon River mainstem	High	Moderate	High Risk	Viable
	Secesh River	High	Low	High Risk	Highly Viable
	East Fork South Fork Salmon River	High	Low	High Risk	Maintained
Middle Fork Salmon River (Idaho)	Chamberlain Creek	High	Low	High Risk	Viable
	Middle Fork Salmon River below Indian Creek	High	Moderate	High Risk	Maintained
	Big Creek	High	Moderate	High Risk	Highly Viable
	Camas Creek	High	Moderate	High Risk	Maintained
	Loon Creek	*Insuf. data*	Moderate	High Risk	Viable
	Middle Fork Salmon River above Indian Creek	High	Moderate	High Risk	Maintained
	Sulphur Creek	High	Moderate	High Risk	Maintained
	Bear Valley Creek	Moderate	Low	Maintained	Viable
	Marsh Creek	Moderate	Low	Maintained	Viable
Upper Salmon River (Idaho)	North Fork Salmon River	*Insuf. data*	Low	High Risk	Maintained
	Lemhi River	High	High	High Risk	Viable
	Salmon River Lower Mainstem	High	Low	High Risk	Maintained
	Pahsimeroi River	High	High	High Risk	Viable
	East Fork Salmon River	High	High	High Risk	Viable
	Yankee Fork Salmon River	High	High	High Risk	Maintained
	Valley Creek	High	Moderate	High Risk	Viable
	Salmon River Upper Mainstem	High	Low	High Risk	Highly Viable
	Panther Creek[3]	*Insuf. data*	High	High Risk	***Reintroduction***
Lower Snake (Washington)	Tucannon River	High	Moderate	High Risk	Highly Viable
	Asotin Creek			***Extirpated***	***Consider Reintroduction***
Grande Ronde and Imnaha Rivers (Oregon/ Washington)[4]	Wenaha River	High	Moderate	High Risk	Highly Viable or Viable
	Lostine/Wallowa River	High	Moderate	High Risk	Highly Viable or Viable
	Minam River	Moderate	Moderate	Maintained	Highly Viable or Viable
	Catherine Creek	High	Moderate	High Risk	Highly Viable or Viable
	Upper Grande Ronde River	High	High	High Risk	Maintained
	Imnaha River	High	Moderate	High Risk	Highly Viable or Viable
	Lookingglass Creek			***Extirpated***	***Consider Reintroduction***
	Big Sheep Creek			***Extirpated***	***Consider Reintroduction***

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.

[2]There are several scenarios that could meet the requirements for ESU recovery (as reflected in the proposed goals for populations in Oregon and Washington). What is reflected here for populations in Idaho are the proposed status goals selected by NMFS and the State of Idaho.
[3]Although considered functionally extirpated in the late 1960s, redds have been documented in Panther Creek every year since 2005. Considering the natural spawning that has occur, the role of the Panther Creek population in the MPG recovery scenario may be reevaluated (NMFS 2022a).
[4]At least one of the populations must achieve a very low viability risk rating.

Abundance and Productivity.
Historically, the Snake River drainage is thought to have produced more than 1.5 million adult spring/summer Chinook salmon in some years (Matthews and Waples 1991), yet in 1994 and 1995, fewer than 2,000 naturally produced adults returned to the Snake River (ODFW and WDFW 2022). From the mid-1990s and the early 2000s, the population increased dramatically and peaked in 2001 at 45,273 naturally produced adult returns. Since 2001, the numbers have fluctuated between 32,324 (2003) and 4,183 (2019) (ODFW and WDFW 2022). Productivity is below recovery objectives for all of the populations (NMFS 2017a) and has been below replacement for nearly all populations in the ESU since 2012 (Nau et al. 2021).

As reported in the most recent viability assessment (Ford 2022), the five-year (2015-2019) geometric mean abundance estimates for 26 of the 27 evaluated populations are lower than the corresponding estimates for the previous five-year period by varying degrees, with an average decline of 55 percent. The consistent and sharp declines in 15-year population trends for all populations in the ESU are concerning, with the abundance levels for some populations approaching similar levels to those of the early 1990s when the ESU was listed (NMFS 2022a). No populations within the ESU meet the minimum abundance threshold designated by the ICTRT (NMFS 2022a), and the vast majority of the extant populations are considered to be at high risk of extinction due to low abundance/productivity (Ford 2022). Therefore, all currently extant populations of SR spring/summer Chinook salmon will likely have to increase in abundance and productivity in order for the ESU to recover (Table 2).

Summary.
Overall, this ESU is at a moderate-to-high risk of extinction. While there have been improvements in abundance/productivity in several populations since the time of listing, the majority of populations experienced sharp declines in abundance in recent years. If productivity remains low, the ESU’s viability will become more tenuous. If productivity improves, populations could increase again, similar to what was observed in the early 2000s. This ESU continues to face threats from disease; predation; harvest; habitat loss, alteration, and degradation; and climate change (NMFS 2022a).

2.2.1.2. Snake River Fall-run Chinook Salmon

The SR fall Chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. SR fall Chinook salmon have substantially declined in abundance from historic levels, primarily due to the loss of primary spawning and rearing areas upstream of the Hells Canyon Dam complex (57 FR 14653). Additional concerns for the species have been the high percentage of hatchery fish returning to natural spawning grounds and the relatively high aggregate harvest impacts by ocean and in-river fisheries (Good et al. 2005). NMFS completed its 5-year review for Pacific salmon and steelhead in 2022 and concluded the species should remain listed as threatened (NMFS 2022c).

Life History.
SR fall Chinook salmon enter the Columbia River in July and August, and migrate past the lower Snake River mainstem dams from August through November. Fish spawning takes place from October through early December in the mainstem of the Snake River, primarily between Asotin Creek and Hells Canyon Dam, and in the lower reaches of several of the associated major tributaries including the Tucannon, Grande Ronde, Clearwater, Salmon, and Imnaha Rivers (Connor and Burge 2003; Ford 2011). Fall Chinook salmon also occasionally spawn in the mainstem Snake River downstream from Lower Granite Dam (Dauble et al. 1999; Dauble et al. 1995; Dauble et al. 1994; Mueller 2009). Juveniles emerge from the gravels in March and April of the following year.

Most SR fall Chinook salmon exhibit an "ocean-type" life history (Dauble and Geist 2000; Good et al. 2005; Healey 1991; NMFS 1992) wherein they migrate to the Pacific Ocean during their first year of life, normally within 3 months of emergence from the spawning substrate as age 0 smolts, to spend their first winter in the ocean. Ocean-type Chinook salmon juveniles tend to display a "rear as they go" strategy, in which they continually move downstream through shallow shoreline habitats during their first summer and fall, continually growing until reach the ocean by winter (Connor and Burge 2003; Coutant and Whitney 2006). Tiffan and Connor (2012) showed that subyearling fish favor water less than 6 feet deep and Tiffan et al. (2014) found that riverine reaches were likely better rearing habitat than reservoir reaches.

A series of studies in the early 2000s demonstrated that a significant number of SR fall Chinook salmon juveniles exhibit a stream-type life history. These fish arrest their seaward migration and overwinter in reservoirs on the Snake and Columbia Rivers, then resume migration and enter the ocean in early spring as age-1 smolts (Connor and Burge 2003; Connor et al. 2002; Connor et al. 2005; Hegg et al. 2013). Connor et al. (2005) termed this life history strategy "reservoir-type." Scale samples from natural-origin adult fall Chinook salmon taken at Lower Granite Dam have indicated that approximately half of the returns overwintered in freshwater (Ford 2011).

Spatial Structure and Diversity.
The SR fall Chinook salmon ESU includes one extant population of fish spawning in the mainstem of the Snake River and the lower reaches of several of the associated major tributaries including the Tucannon, Grande Ronde, Clearwater, Salmon, and Imnaha Rivers. The ESU also includes four artificial propagation programs: the Lyons Ferry Hatchery, Fall Chinook Acclimation Ponds, Nez Perce Tribal Hatchery, and Idaho Power programs (85 FR 81822). Historically, this ESU included one large additional population spawning in the mainstem of the Snake River upstream of the Hells Canyon Dam complex (Ford 2022). The extant population currently spawns in all five of its historic major spawning areas. The spatial structure risk for this population is therefore low and is not precluding recovery of the species (Ford 2022).

There are several diversity concerns for SR fall Chinook salmon, leading to a moderate diversity risk rating for the extant Lower Snake population. One concern is the relatively high proportion of hatchery spawners (70 percent) in all major spawning areas within the population (Ford 2022;

NMFS 2017b). The fraction of natural-origin fish on the spawning grounds has remained relatively stable, with five-year means of 31 percent (2010-2014) and 33 percent (2015-2019) (Ford 2022). The diversity risk will need to be reduced to low in order for this population to be considered highly viable. Because there is only one extant population, it must achieve highly viable status in order for the ESU to recover.

Abundance and Productivity.
Historical abundance of SR fall Chinook salmon is estimated to have been 416,000 to 650,000 adults (NMFS 2006), but numbers declined drastically over the 20th century, with only 78 natural-origin fish (WDFW and ODFW 2021) and 306 hatchery-origin fish (FPC 2019) passing Lower Granite Dam in 1990. After 1990, abundance increased dramatically, and exceeded 10,000 natural-origin returns each year from 2012-2015. However, the 5-year geometric means of natural origin-spawners has declined by 36 percent between the 2010-2014 (11,254) and 2015-2019 (7,252) time periods. Although there have been recent declines in natural origin returns, the 10-year geometric mean for the years 2010-2019 (9,034 natural-origin adults) exceeds the recovery plan abundance metric (i.e., greater than 4,200 natural-origin spawners) (Ford 2022; NMFS 2017b; NMFS 2022c). While the recovery plan abundance metric is currently exceeded, the associated 20-year geometric mean of population productivity is only 0.63, which is far below the recovery plan metric of 1.7.

Summary.
The status of this ESU has improved since the time of listing. While the population is currently considered to be viable, it is not meeting its recovery goals. This is due to: (1) low population productivity; (2) uncertainty about whether the elevated natural-origin abundance can be sustained over the long term; and (3) high levels of hatchery-origin spawners in natural spawning areas (NMFS 2022c). This ESU also continues to face threats from tributary and mainstem habitat loss, degradation, or modification; disease; predation; harvest; hatcheries; and climate change (NMFS 2022c).

2.2.1.3. Snake River Sockeye Salmon

This ESU includes all anadromous and residual sockeye salmon from the Snake River basin in Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake captive propagation and SR sockeye salmon hatchery programs (85 FR 81822). The ESU was first listed as endangered under the ESA in 1991, and the listing was reaffirmed in 2005 (70 FR 37160). Reasons for the decline of this species include high levels of historic harvest, dam construction including hydropower development on the Snake and Columbia Rivers, water diversions and water storage, predation on juvenile salmon in the mainstem river migration corridor, and active eradication of sockeye salmon from some lakes in the 1950s and 1960s (56 FR 58619; ICTRT 2003). NMFS completed its 5-year review for Pacific salmon and steelhead in 2022 and concluded the species should remain listed as threatened (NMFS 2022d).

Life History.
SR sockeye salmon adults enter the Columbia River primarily during June and July, and arrive in the Sawtooth Valley peaking in August. The Sawtooth Valley supports the only remaining run of SR sockeye salmon. The adults spawn in lakeshore gravels, primarily in October (Bjornn et al. 1968). Eggs hatch in the spring between 80 and 140 days after spawning. Fry remain in the

gravel for 3 to 5 weeks, emerging from April through May. Juveniles remain in the natal lake feeding on plankton for 1 to 3 years before they migrate to the ocean, leaving their natal lake in the spring from late April through May (Bjornn et al. 1968). The SR sockeye salmon usually spend 2 to 3 years in the Pacific Ocean and return to Idaho in their 4th or 5th year of life.

Spatial Structure and Diversity.
Within the Snake River ESU, the ICTRT identified historical sockeye salmon production in five Sawtooth Valley lakes, in addition to Warm Lake and the Payette Lakes in Idaho and Wallowa Lake in Oregon (ICTRT 2003). The sockeye salmon runs to Warm, Payette, and Wallowa Lakes are now extinct, and the ICTRT identified the Sawtooth Valley lakes as a single MPG for this ESU. The MPG consists of the Redfish, Alturas, Stanley, Yellowbelly, and Pettit Lake populations (ICTRT 2007). The only extant population is Redfish Lake, which is highly dependent on a captive broodstock program operated at the Sawtooth Hatchery and Eagle Hatchery. Although the captive brood program rescued the ESU from extinction, the diversity risk remains high and will continue to remain high without sustainable natural production (Ford 2022).

Hatchery fish from the Redfish Lake captive propagation program have been outplanted in Alturas and Pettit Lakes since the mid-1990s in an attempt to reestablish those populations, thus improving spatial structure of the ESU (Ford 2011). There is some evidence of very low levels of early-timed returns in some recent years from out-migrating, naturally-produced Alturas Lake smolts, but the ESU remains at high risk for spatial structure. With such a small number of populations in this MPG, the reestablishment of any additional populations would substantially reduce the risk faced by the ESU (ICTRT 2007).

Abundance and Productivity.
Prior to the turn of the 20th century (ca. 1880), around 150,000 sockeye salmon ascended the Snake River to the Wallowa, Payette, and Salmon River basins to spawn in natural lakes (Evermann 1896, as cited in Chapman et al. 1990). The Wallowa River sockeye salmon run was considered extinct by 1905, the Payette River run was blocked by Black Canyon Dam on the Payette River in 1924, and anadromous Warm Lake sockeye salmon in the South Fork Salmon River basin may have been trapped in Warm Lake by a land upheaval in the early 20th century (ICTRT 2003). In the Sawtooth Valley, the Idaho Department of Fish and Game eradicated sockeye salmon from Yellowbelly, Pettit, and Stanley Lakes in favor of other species in the 1950s and 1960s, and irrigation diversions led to the extirpation of sockeye salmon in Alturas Lake in the early 1900s (ICTRT 2003), leaving only the Redfish Lake sockeye salmon population. From 1991 to 1998, a total of just 16 wild adult anadromous sockeye salmon returned to Redfish Lake. These 16 wild fish were incorporated into a captive broodstock program that began in 1992 and has since expanded. The program currently releases hundreds of thousands of juvenile fish each year in the Sawtooth Valley (Ford 2011).

The increased abundance of hatchery reared SR sockeye salmon reduces the risk of extinction over the short-term, but levels of naturally produced sockeye salmon returns are variable and remain extremely low (Ford 2022). The ICTRT's viability target is at least 1,000 naturally produced spawners per year in each of Redfish and Alturas Lakes and at least 500 in Pettit Lake (ICTRT 2007). The highest adult returns since the captive broodstock program began were in

2014, with a total of 1,579 counted in the Stanley basin (Ford 2022). The general increases observed in the number of adult returns during 2008-2014 were likely due to a number of factors, including increases in hatchery production and favorable marine conditions. The 5-year geometric mean of natural-origin adult returns was 137 for 2010-2014. Since then, natural-origin adult returns have declined with a 2015-2019 5-year geometric mean of 16 (Ford 2022). Adult returns crashed in 2015 due to a combination of low flows and warm water temperatures in the migration corridor. There was also high in-basin mortality of smolts released in 2015-2017 due to water chemistry shock between hatchery waters and the water of Redfish Lake (Ford 2022). The total number of returning adults documented in the Sawtooth Valley in 2020 was 152 (Dan Baker, IDFG, email sent to Chad Fealko, NMFS, November 2, 2021 regarding 2020 sockeye salmon returns). The recent general decline is in part due to poor survival and growth in the ocean.

The species remains at high risk across all four parameters (spatial structure, diversity, abundance, and productivity). Although the captive brood program has been highly successful in producing hatchery sockeye salmon, substantial increases in survival rates across all life history stages must occur in order to reestablish sustainable natural production (Ford 2022). In particular, juvenile and adult losses during travel through the Salmon, Snake, and Columbia River migration corridor continue to present a significant threat to species recovery (NMFS 2022d).

Summary.
Considering the limited to extremely low levels of natural production, the high spatial structure and diversity risks, and climate change vulnerability; the viability of the SR sockeye salmon ESU has likely declined in recent years and the ESU is at a high risk of extinction within 100 years. This ESU continues to face threats from habitat modification and degradation through the migratory corridor, predation, disease, and climate change (NMFS 2022d).

2.2.1.4. Snake River Basin Steelhead

The SRB steelhead was listed as a threatened ESU on August 18, 1997 (62 FR 43937), with a revised listing as a DPS on January 5, 2006 (71 FR 834). This DPS occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the mainstem Snake and Columbia Rivers, loss of habitat above the Hells Canyon Dam complex on the mainstem Snake River, and widespread habitat degradation and reduced streamflows throughout the Snake River basin (Good et al. 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in the aggregate run of SRB steelhead over Lower Granite Dam (Good et al. 2005; Ford 2011). NMFS completed its 5-year review for Pacific salmon and steelhead in 2022 and concluded the species should remain listed as threatened (NMFS 2022b).

Life History.
Adult SRB steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the Snake River basin, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower

elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

Spatial Structure and Diversity.
This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the Snake River basin of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of six artificial propagation programs (85 FR 81822). The artificial propagation programs include the Dworshak National Fish Hatchery, Salmon River B-run, South Fork Clearwater B-run, East Fork Salmon River Natural, Tucannon River, and the Little Sheep Creek/Imnaha River programs. The SRB steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The ICTRT identified 24 extant populations within this DPS, organized into five MPGs (ICTRT 2003). The ICTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. The five MPGs with extant populations are the Clearwater River, Salmon River, Grande Ronde River, Imnaha River, and Lower Snake River. In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, Table 3 shows the current risk ratings for the parameters of a VSP (spatial structure, diversity, abundance, and productivity).

SRB steelhead exhibit a diversity of life-history strategies, including variations in fresh water and ocean residence times. Traditionally, fisheries managers have classified these steelhead into two groups, A-run and B-run, based on ocean age at return, adult size at return, and migration timing. A-run steelhead predominantly spend 1 year in the ocean; B-run steelhead are larger with most individuals returning after 2 years in the ocean. Most Snake River populations support a mixture of the two run types, with the highest percentage of B-run fish in the upper Clearwater River and the South Fork Salmon River; moderate percentages of B-run fish in the Middle Fork Salmon River; and very low percentages of B-run fish in the Upper Salmon River, Grande Ronde River, and Lower Snake River (NWFSC 2015). Maintaining life history diversity is important for the recovery of the species.

The spatial structure risk is considered to be low or very low for the vast majority of populations in this DPS. This is because juvenile steelhead (age-1 parr) were detected in 97 of the 112 spawning areas (major and minor) that are accessible by spawning adults. Diversity risk for populations in the DPS is either moderate or low. Large numbers of hatchery steelhead are released in the Snake River, and while new information about the relative abundance of natural-origin spawners is available, the relative proportion of hatchery adults in natural spawning areas near major hatchery release sites remains uncertain (Ford 2022). Reductions in hatchery-related diversity risks would increase the likelihood of these populations reaching viable status.

Table 3. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the Snake River Basin steelhead distinct population segment (Ford 2022; NMFS 2017a; NMFS 2022b). Individuals from each population group may be exposed to the effects of the action.

Major Population Group	Population	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[2]
Lower Snake River[3]	Tucannon River	High	Moderate	High Risk	Highly Viable or Viable
	Asotin Creek	Low	Moderate	Viable	Highly Viable or Viable
Grande Ronde River	Lower Grande Ronde	High	Moderate	High Risk	Viable or Maintained
	Joseph Creek	Low	Low	Viable	Highly Viable, Viable, or Maintained
	Wallowa River	High	Low	High Risk	Viable or Maintained
	Upper Grande Ronde	Very Low	Moderate	Viable	Highly Viable or Viable
Imnaha River	Imnaha River	Very Low	Moderate	Viable	Highly Viable
Clearwater River (Idaho)	Lower Mainstem Clearwater River	Very Low	Low	Highly Viable	Viable
	South Fork Clearwater River	Very Low	Moderate	Viable	Maintained
	Lolo Creek	High	Moderate	High Risk	Maintained
	Selway River	Moderate	Low	Maintained	Viable
	Lochsa River	Moderate	Low	Maintained	Highly Viable
	North Fork Clearwater River			*Extirpated*	*N/A*
Salmon River (Idaho)	Little Salmon River	Very Low	Moderate	Viable	Maintained
	South Fork Salmon River	Moderate	Low	Maintained	Viable
	Secesh River	Moderate	Low	Maintained	Maintained
	Chamberlain Creek	Moderate	Low	Maintained	Viable
	Lower Middle Fork Salmon River	Moderate	Low	Maintained	Highly Viable
	Upper Middle Fork Salmon River	Moderate	Low	Maintained	Viable
	Panther Creek	Moderate	High	High Risk	Viable
	North Fork Salmon River	Moderate	Moderate	Maintained	Maintained
	Lemhi River	Moderate	Moderate	Maintained	Viable
	Pahsimeroi River	Moderate	Moderate	Maintained	Maintained
	East Fork Salmon River	Moderate	Moderate	Maintained	Maintained

Major Population Group	Population	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[2]
Salmon River (Idaho)	Upper Mainstem Salmon River	Moderate	Moderate	Maintained	Maintained
Hells Canyon	Hells Canyon Tributaries			*Extirpated*	

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.
[2]There are several scenarios that could meet the requirements for ESU recovery (as reflected in the proposed goals for populations in Oregon and Washington). What is reflected here for populations in Idaho are the proposed status goals selected by NMFS and the State of Idaho.
[3]At least one of the populations must achieve a very low viability risk rating.

Abundance and Productivity.
Historical estimates of steelhead production for the entire Snake River basin are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good et al. 2005). The Clearwater River drainage alone may have historically produced 40,000 to 60,000 adults (Ecovista et al. 2003), and historical harvest data suggests that steelhead production in the Salmon River was likely higher than in the Clearwater (Hauck 1953). In contrast, at the time of listing in 1997, the 5-year geometric mean abundance for natural-origin steelhead passing Lower Granite Dam, which includes all but one population in the DPS, was 11,462 adults (Ford 2011). Abundance began to increase in the early 2000s, with the single year count and the 5-year geometric mean both peaking in 2015 at 45,789 and 34,179, respectively (ODFW and WDFW 2022). Since 2015, the 5-year geometric means have declined steadily with only 11,557 natural-origin adult returns for the most recent 5-year geometric mean (ODFW and WDFW 2022).

Summary.
Based on information available for the 2022 viability assessment, none of the five MPGs are meeting their recovery plan objectives and the viability of many populations remains uncertain. The recent, sharp declines in abundance are of concern and are expected to negatively affect productivity in the coming years. Overall, available information suggests that SRB steelhead continue to be at a moderate risk of extinction within the next 100 years. This DPS continues to face threats from tributary and mainstem habitat loss, degradation, or modification; predation; harvest; hatcheries; and climate change (NMFS 2022b).

2.2.2. Status of Critical Habitat

In evaluating the condition of designated critical habitat, NMFS examines the condition and trends of PBFs, which are essential to the conservation of the ESA-listed species because they support one or more life stages of the species. Proper function of these PBFs is necessary to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and the growth and development of juvenile fish. Modification of PBFs may affect freshwater spawning, rearing or migration in the action area. Generally speaking, sites required to support one or more life stages of the ESA-listed species (i.e., sites for spawning, rearing, migration, and foraging) contain PBF essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food) (Table 4).

Table 4. Types of sites, essential physical and biological features (PBFs), and the species life stage each PBF supports.

Site	Essential Physical and Biological Features	Species Life Stage
Snake River basin steelhead		
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity and floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage[b]	Juvenile development
	Natural cover[c]	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover[c]	Juvenile and adult mobility and survival
Snake River spring/summer Chinook salmon, fall Chinook, and sockeye salmon		
Spawning and juvenile rearing	Spawning gravel, water quality and quantity, cover/shelter (Chinook only), food, riparian vegetation, space (Chinook only), water temperature, and access (sockeye only)	Juvenile and adult
Migration	Substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food[d], riparian vegetation, space, safe passage	Juvenile and adult

[a] Additional PBFs pertaining to estuarine areas have also been described for Snake River steelhead. These PBFs will not be affected by the proposed action and have therefore not been described in this opinion.
[b] Forage includes aquatic invertebrate and fish species that support growth and maturation.
[c] Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
[d] Food applies to juvenile migration only.

Table 5 describes the geographical extent of critical habitat within the Snake River basin for each of the four ESA-listed salmon and steelhead species. Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. In addition, critical habitat for the three salmon species includes the adjacent riparian zone, which is defined as the area within 300 feet of the line of high water of a stream channel or from the shoreline of standing body of water (58 FR 68543). The riparian zone is critical because it provides shade, streambank stability, organic matter input, and regulation of sediment, nutrients, and chemicals.

Spawning and rearing habitat quality in tributary streams in the Snake River varies from excellent in wilderness and roadless areas to poor in areas subject to intensive human land uses (NMFS 2015; NMFS 2017a). Critical habitat throughout much of the Interior Columbia, (which includes the Snake River and the Middle Columbia River) has been degraded by intensive agriculture, alteration of stream morphology (i.e., channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer streamflows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in non-wilderness areas. Human land use practices throughout the basin have caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations.

Table 5. Geographical extent of designated critical habitat within the Snake River basin for ESA-listed salmon and steelhead.

Evolutionarily Significant Unit (ESU)/ Distinct Population Segment (DPS)	Designation	Geographical Extent of Critical Habitat
Snake River sockeye salmon	58 FR 68543; December 28, 1993	Snake and Salmon Rivers; Alturas Lake Creek; Valley Creek, Stanley Lake, Redfish Lake, Yellowbelly Lake, Pettit Lake, Alturas Lake; all inlet/outlet creeks to those lakes.
Snake River spring/summer Chinook salmon	58 FR 68543; December 28, 1993 64 FR 57399; October 25, 1999	All Snake River reaches upstream to Hells Canyon Dam; all river reaches presently or historically accessible to Snake River spring/summer Chinook salmon within the Salmon River basin; and all river reaches presently or historically accessible to Snake River spring/summer Chinook salmon within the Hells Canyon, Imnaha, Lower Grande Ronde, Upper Grande Ronde, Lower Snake–Asotin, Lower Snake–Tucannon, and Wallowa subbasins.
Snake River fall Chinook salmon	58 FR 68543; December 28, 1993	Snake River to Hells Canyon Dam; Palouse River from its confluence with the Snake River upstream to Palouse Falls; Clearwater River from its confluence with the Snake River upstream to Lolo Creek; North Fork Clearwater River from its confluence with the Clearwater River upstream to Dworshak Dam; and all other river reaches presently or historically accessible within the Lower Clearwater, Hells Canyon, Imnaha, Lower Grande Ronde, Lower Salmon, Lower Snake, Lower Snake–Asotin, Lower North Fork Clearwater, Palouse, and Lower Snake–Tucannon subbasins.
Snake River Basin steelhead	70 FR 52630; September 2, 2005	Specific stream reaches are designated within the Lower Snake, Salmon, and Clearwater River basins. Table 21 in the Federal Register details habitat areas within the DPS's geographical range that are excluded from critical habitat designation.

In many stream reaches designated as critical habitat in the Snake River basin, streamflows are substantially reduced by water diversions (NMFS 2015; NMFS 2017a). Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence et al. 1996). Reduced tributary streamflow has been identified as a major limiting factor for Snake River spring/summer Chinook and SRB steelhead in particular (NMFS 2017a).

Many stream reaches designated as critical habitat for these species are listed on the Clean Water Act 303(d) list for impaired water quality, such as elevated water temperature (IDEQ 2020). Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures, such as some stream reaches in the Upper Grande Ronde.

Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Water quality in spawning and rearing areas in the Snake River has also been impaired by high levels of sedimentation and by heavy metal contamination from mine waste (e.g., IDEQ and USEPA 2003; IDEQ 2001).

The construction and operation of water storage and hydropower projects in the Columbia River basin, including the eight run-of-river dams on the mainstem lower Snake and lower Columbia Rivers, have altered biological and physical attributes of the mainstem migration corridor. Hydrosystem development modified natural flow regimes, resulting in warmer late summer and fall water temperature. Changes in fish communities led to increased rates of piscivorous predation on juvenile salmon and steelhead. Reservoirs and project tailraces have created opportunities for avian predators to successfully forage for smolts, and the dams themselves have created migration delays for both adult and juvenile salmonids. Physical features of dams, such as turbines, also kill out-migrating fish. In-river survival is inversely related to the number of hydropower projects encountered by emigrating juveniles. However, some of these conditions have improved. The Bureau of Reclamation and COE have implemented measures in previous Columbia River System hydropower consultations to improve conditions in the juvenile and adult migration corridor including 24-hour volitional spill, surface passage routes, upgrades to juvenile bypass systems, and predator management measures. These measures are ongoing and their benefits with respect to improved functioning of the migration corridor PBFs will continue into the future.

2.2.3. Climate Change Implications for ESA-listed Species and their Critical Habitat

One factor affecting the rangewide status of Snake River salmon and steelhead, and aquatic habitat at large is climate change. As observed by Siegel and Crozier in 2019, long-term trends in warming have continued at global, national, and regional scales. The five warmest years in the 1880 to 2019 record have all occurred since 2015, while 9 of the 10 warmest years have occurred since 2005 (Lindsey and Dahlman 2020). The year 2020 was another hot year in national and global temperatures; it was the second hottest year in the 141-year record of global land and sea measurements and capped off the warmest decade on record (http://www.ncdc.noaa.gov/sotc/global202013).

Events such as the 2014-2016 marine heatwave (Jacox et al. 2018) have been attributed directly to anthropogenic warming, as noted in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). The U.S. Global Change Research Program (USGCRP) reports average warming in the Pacific Northwest of about 1.3ºF from 1895 to 2011, and projects an increase in average annual temperature of 3.3ºF to 9.7ºF by 2070 to 2099 (compared to the period 1970 to 1999), depending largely on total global emissions of heat-trapping gases (predictions based on a variety of emission scenarios including B1, RCP 4.5, A1B, A2, A1FI, and RCP8.5 scenarios). The increases are projected to be largest in summer (Melillo et al. 2014; USGCRP 2018).

Climate change generally exacerbates threats and limiting factors, including those currently impairing salmon and steelhead survival and productivity. The growing frequency and magnitude of climate change related environmental downturns will increasingly imperil many

ESA-listed stocks in the Columbia River basin and amplify their extinction risk (Crozier et al. 2019, 2020, 2021). This climate change context means that opportunities to rebuild these stocks will likely diminish over time. As such, management actions that increase resilience and adaptation to these changes should be prioritized and expedited. For example, the importance of improving the condition of and access and survival to and from the remaining functional, high-elevation spawning and nursery habitats is accentuated because these habitats are the most likely to retain remnant snowpacks under predicted climate change (Tonina et al. 2022).

Climate change is already evident. It will continue to affect air temperatures, precipitation, and wind patterns in the Pacific Northwest, resulting in increased droughts and wildfires and variation in river flow patterns (Independent Scientific Advisory Board (ISAB 2007, Philip et al. 2021). These conditions differ from those, under which native anadromous and resident fishes evolved and will likely increase risks posed by invasive species and altered food webs. The frequency, magnitude, and duration of elevated water temperature events have increased with climate change and are exacerbated by the Columbia River hydrosystem (EPA 2020a, 2020b; Scott 2020). Thermal gradients (i.e., rapid change to elevated water temperatures) encountered while passing dams via fish ladders can slow, reduce, or altogether stop the upstream movements of migrating salmon and steelhead (e.g., Caudill et al. 2013). Additional thermal loading occurs when mainstem reservoirs act as a heat trap due to upstream inputs and solar irradiation over their increased water surface area (EPA 2020a, 2020b, 2021). Consider the example of adult sockeye salmon in 2015, when high summer water temperatures contributed to extremely high losses of Columbia River and Snake River stocks during passage through the mainstem Columbia and Snake River (Crozier et al. 2020), and through tributaries such as the Salmon and Okanogan rivers, below their spawning areas. Some stocks are already experiencing lethal thermal barriers during a portion of their adult migration. The effects of longer or more severe thermal barriers in the future could be catastrophic. For example, Bowerman et al. (2021) concluded that climate change will likely increase the factors contributing to prespawn mortality of Chinook salmon across the entire Columbia River basin.

Columbia River basin salmon and steelhead spend a significant portion of their life-cycle in the ocean, and as such the ocean is a critically important habitat influencing their abundance and productivity. Climate change is also altering marine environments used by Columbia River basin salmon and steelhead. This includes increased frequency and magnitude of marine heatwaves, changes to the intensity and timing of coastal upwelling, increased frequency of hypoxia (low oxygen) events, and ocean acidification. These factors are already reducing, and are expected to continue reducing, ocean productivity for salmon and steelhead. This does not mean the ocean is getting worse every year, or that there will not be periods of good ocean conditions for salmon and steelhead. In fact, near-shore conditions off the Oregon and Washington coasts were considered good in 2021 (NOAA 2022). However, the magnitude, frequency, and duration of downturns in marine conditions are expected to increase over time due to climate change. Any long-term effects of the stressors that fish experience during freshwater stages that do not manifest until the marine environment will be amplified by the less-hospitable conditions there due to climate change. Together with increased variation in freshwater conditions, these downturns will further impair the abundance, productivity, spatial structure, and diversity of the region's native salmon and steelhead stocks (ISAB 2007, Isaak et al. 2018). As such, these climate dynamics will reduce fish survival through direct and indirect impacts at all life stages (NOAA 2022).

All habitats used by Pacific salmon and steelhead will be affected by climate dynamics. However, the impacts and certainty of the changes will likely vary by habitat type. Some changes affect salmon at all life stages in all habitats (e.g., increasing temperature), while others are habitat-specific (e.g., stream-flow variation in freshwater, sea-level rise in estuaries, upwelling in the ocean). How climate change will affect each individual salmon or steelhead stock also varies widely, depending on the extent and rate of change and the unique life-history characteristics of different natural populations (Crozier et al. 2008). The continued persistence of salmon and steelhead in the Columbia basin relies on restoration actions that enhance climate resilience (Jorgensen et al. 2021) in freshwater spawning, rearing, and migratory habitats, including access to high elevation, high quality cold-water habitats, and the reconnection of floodplain habitats across the interior Columbia River basin.

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 for the proposed action includes the area surrounding the in-water activity at the Snake River Orchard pump station at RM 10.8 extending in a radius up to 250 feet. The extent of the action area is defined by the extent of turbidity; we anticipate that removal of the silt curtain will increase turbidity up to 250 downstream of the work site. The action area includes the in-water project site (sheet pile, dredging, intake pipes, and screen installation); the pump station and supporting facilities; equipment use and storage locations; stockpile locations; shoreline, riparian, and upland areas surrounding the Snake River Orchard pump station; and areas upstream and downstream of the in-water work area that are likely to be affected by the proposed action.

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. 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 consultations, and the impact of State or private actions, which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

The project site is located on the southern shoreline of the Snake River in the Ice Harbor pool, approximately 1.2 miles upstream of the Ice Harbor Dam. The Ice Harbor pool is hydrologically controlled by Ice Harbor Dam, and the ordinary high-water mark (OHWM) at the project site is based on the Normal Full Pool elevation of 440 feet (National Geodetic Vertical Datum of 1929). There are three pump stations located at the site, immediately adjacent to each other. The Snake

River Orchard pump station is the most westerly. There are also four electrical buildings and Columbia Rural Electric Association electrical substation on the site. Access to the site is via a gravel road. These pump stations are located in a small bay that was likely excavated to accommodate the stations. The habitat inside this bay appears to be similar in quality to adjacent reservoir habitat with moderate amounts of riparian vegetation and silt/sand/gravel substrates.

The two pump stations not owned by Snake River Orchard were replaced recently and are in good condition. The existing intake screens at the Snake River Orchard pump station are vertical frames with woven wire over them that frequently get plugged and are difficult to clean. The existing intake screens do not meet current NMFS requirements and are likely a source of mortality for juvenile salmon and steelhead.

Current conditions within much of the mainstem Snake River are degraded relative to historical conditions, a reflection of a multitude of actions whose effects frame the environmental baseline in the action area. The action area includes the footprint of in-water construction along the shoreline, and within shallow waters and upland areas of the mainstem Snake River. The general topography within the vicinity of the project site consists of relatively level uplands, that transition to areas of steep sloping, riprap-armored bank along the immediate shoreline. Vegetation surrounding the project site is dominated by species typical of the sagebrush-steppe vegetation community in eastern Washington. The Snake River shoreline, shallow water habitat, and natural vegetation is altered with in-water structures, rock, and riprap. Consequently, the potential for normal riparian processes (e.g., litterfall, channel complexity, and large wood recruitment) to occur is diminished and aquatic habitat has become simplified. Furthermore, riparian species that evolved under the environmental gradients of riverine ecosystems are not well suited to the present hydraulic setting of the action area (i.e., static, slack water pools), and are thus often replaced by invasive, non-native plant species. The riparian system is fragmented, poorly connected, and provides inadequate protection of habitats and refugia for sensitive aquatic species.

Shoreline developments and alterations have reduced rearing habitat suitability (e.g., less habitat complexity, reduced forage base), reduced spring water velocities, (which hampers downstream migration by smolts), disconnecting the Snake River from historical floodplain rearing areas, and created better habitat for juvenile salmonid predators (e.g., birds, and native and non-native fish). These factors further limit habitat function by reducing cover, attracting predators and reducing foraging efficiency for juvenile salmonids.

The Snake River within the action area is on the Washington Department of Ecology’s Water Quality Atlas 303(d) list for temperature and is listed as water quality limited for total dissolved gas and dioxin in Washington Department of Ecology (WDOE 2021). Many factors have contributed to decreases in water quality, but they are primarily related to land-use practices, including dams, channel simplification and widening, and vegetation removal. There has also been an incremental loss of wetlands and increases in groundwater withdrawals, which have contributed to lower base-stream flows, and which in turn contribute to lower overall water quality. In addition, excess nutrients, low levels of dissolved oxygen, heavy metals, and changes in pH have all directly affected water quality for salmon and steelhead. Impoundments created by the dams have resulted in higher water temperatures. Increased water temperatures have occurred throughout the basin, including the action area, and have a significant effect on salmonid metabolism, growth rate, disease resistance, timing of juvenile and adult migrations, fry emergence, and smoltification (ISAB 2007).

The hydropower system has greatly modified natural flow and altered the hydrograph of the Snake River. The volume of water discharged by the Snake River varies seasonally according to runoff, snowmelt, and hydrosystem demands. Water management activities have reduced flows in the Snake River, measured at Ice Harbor Dam, from April through July and eliminated peak-flow events. Additionally, flow management for hydropower has increased flows measured at Ice Harbor Dam during winter months. Maximum flows on the Snake River occur in May, June, and July as a result of snowmelt in headwater regions. Minimum flows occur from September to March, with periodic peaks due to winter rains. Interannual variability in stream flow is strongly correlated with two recurrent climate phenomena, the El Nino/Southern Oscillation and the Pacific Decadal Oscillation. Upstream and downstream dams alter the movement of sediment through the action area. The loss of high spring flows and reduced velocities from backwatering from the downstream dam create a channel that is predominantly cobble and sand substrates with few accumulations of suitable spawning gravels. The relatively high levels of fine substrate (i.e. sand) composition within the action area results in low quality benthic prey production. Travel times of migrating smolts increase as they pass through the reservoirs (compared to a free-flowing river), increasing exposure to both native and nonnative predators.

The mainstem dams and reservoirs, such as the Ice Harbor pool (where the project is located), continue to substantially alter the mainstem migration corridor habitat. The reservoirs have increased the cross-sectional area of the river, reduced water velocity, altered the food web, and created habitat for native and non-native species that are predators, competitors, or food sources for migrating juvenile salmon and steelhead. Additional impacts include increased rates of avian predation on juvenile salmon and steelhead, altered fish passage, and shoreline development, which has reduced natural vegetation, disconnected floodplains, and reduced available off-channel refugia.

The Snake River within the action area serves as a migration corridor for adult and juvenile SR spring/summer and fall-run Chinook salmon, SRB steelhead, and SR sockeye salmon. Generally, out-migrating juveniles do not overwinter in the lower Snake River reservoirs; however, Connor et al. (2005) has found that some yearling SR fall Chinook will overwinter in the lower Snake River reservoirs. Project construction activities will occur during winter when adults and most juveniles do not typically occupy the project area. However, relatively small numbers of adult steelhead could be present year-round in the mainstem Snake River, including the action area. Therefore, we expect only yearling SR fall Chinook salmon and adult SRB steelhead to be exposed to construction-related effects during project implementation. However, we anticipate that juveniles of all salmon and steelhead species will be exposed to the effects (i.e. impingement) of the continued operation of the pump station.

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

2.5.1. Effects to Species

Short term effects to ESA-listed species as a consequence of the proposed project may include effects from hazing and displacement during silt curtain deployment, entrainment or impingement during dredging activities, degraded water quality and alteration of substrates associated with dredging and sheet pile installation, hydroacoustic impacts associated with vibratory hammer use, and chemical contamination due to spills or leaks from machinery. Silt curtain deployment is likely to herd most or all juvenile salmon and steelhead out of the work area so fish will not be exposed to the effects. However, we expect that gaps along the bottom and bank edges will allow fish to move into the work area. The long-term effect of the proposed project is impingement of juvenile ESA-listed species on the newly installed fish screens while the pumps are in operation.

Considering the winter work window and the relatively small size of the affected area, we anticipate that very few fish will be impacted by project activities. Adult steelhead may be in or near the action area but are expected to avoid any impacts. Juvenile steelhead, sockeye salmon, and spring/summer Chinook salmon utilize the Snake River reservoirs during out-migration, which occurs in late spring and early summer; therefore, very few, if any, juvenile fish are expected to be present during construction. Some SR fall Chinook salmon rear in the Snake River reservoirs in the winter months while migrating downstream at slow rates relative to spring (Tiffan et al. 2012). Tiffan and Connor (2012) described juvenile fall Chinook salmon use of lower Snake River reservoirs in 2010 and 2011 and found that radio-tagged subyearling Chinook salmon highly preferred shallow water habitats (less than 2 meters deep) when they were present during the spring and summer and most had migrated through the reservoirs prior to fall. They also found that yearling fall Chinook salmon rarely utilized near-shore shallow habitat during the fall/winter; less than 6 percent of the radio-tagged fish were detected in depths less than 20 feet and less than 82 feet from the shoreline. Depths in the work area are under 20 feet and the artificial inlet is approximately 90 feet in width. Therefore, we expect that yearling fall Chinook salmon will be the only species present in the reservoir during construction activities, but abundance in the action area is likely low due to the lack of pelagic habitat. Tiffan and Connor (2012) reported a mean density for juvenile fall Chinook salmon in Lower Granite Reservoir of 0.002 fish per square meter. Using that density estimate, we expect approximately 12 fish to be present in the action area (approximately 6,161 square meters) and two fish to be present in the inlet where the silt curtain will be deployed (approximately 800 square meters). Therefore, we expect very low numbers of juvenile fall Chinook salmon to be affected by construction activities. Adult and juvenile salmon and steelhead may be exposed to operation of the facility, which will operate in perpetuity.

2.5.1.1 Hazing/Displacement by Silt Curtain Deployment

The silt curtain will be deployed at the face of the pump station and moved through the river inlet for approximately 55 feet and then anchored. It is expected that most or all fish will be herded out of the work area during this action. Fish may be harmed or killed if crushed by the net during deployment. Also, fish fleeing the inlet may be injured or killed by predators prior to finding suitable habitat in the main channel. Given the very low numbers of juvenile salmon and steelhead anticipated to be present in the inlet, we expect that the risk of fish being injured or encountering predators is low, although it cannot be discounted.

2.5.1.2 Entrainment/Impingement by Machinery

Prior to installing the new intake pipe and screens, approximately 37 cubic yard of sediment will need to be dredged from a 441 square foot area in the Snake River stream channel. Entrainment/impingement may occur if fish are trapped in the bucket of the excavator during dredging of in-water substrates. The potential for entrainment is largely dependent on the likelihood of fish occurring within the dredging area, the scope and scale of the dredging activity, and the life stage of the fish. Given the proposed timing of in-water work (early winter 2023), utilization of fish herding and worksite isolation with the turbidity curtain, use of an open bucket excavator, and relatively slow speed of dredging; it is reasonably certain that the risk of injury or lethal take of juvenile ESA-listed fish species from proposed dredging activities will be small, involving very few juvenile fish. Adult salmon and juvenile steelhead, sockeye salmon, and spring/summer Chinook salmon will not be present during the work window. Adult steelhead (if present in the area) will likely be excluded by the turbidity curtain and not exposed to the effects of the dredging.

2.5.1.3 Turbidity

Short-term, localized project-related increases in turbidity levels will likely occur as a result of proposed dredging and sheet pile installation activities below the OHWM. The turbidity created from these activities should be confined to the area within the inlet behind the silt curtain (approximately 5,000 square feet). In the short-term, increases in turbidity can reduce forage quantity for salmonids, and disrupt behavioral patterns such as feeding and sheltering. Exposure duration is a critical determinant of physical or behavioral turbidity effects. Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such seasonal high pulse exposures (NMFS 2011a). Total time for dredging to deepen the pump basin expected to be approximately four hours and the sheet pile driving is not expected to extend past eight hours. Given the existing substrate conditions (primarily silty gravel and sand), timing of in-water work (early winter 2023), and proposed conservation measures, including use of a vibratory hammer for sheet pile installation; it is anticipated the any project related increases in turbidity will be limited and highly localized. We expect the action area will return to background turbidity within one day following in-water dredging and pile driving. Because turbidity producing actions are relatively short in duration (up to 12 hours), we expect turbidity plumes will be small and short-lived and primarily contained inside the silt-curtained area; therefore, we expect juvenile salmon and steelhead will be able to return to normal rearing and migrating activities very quickly following the in-water work and any behavioral effects will be short term. We expect that removal of the silt curtain will create a turbidity plume that may extend up to 250 feet beyond the pump station; this plume should be short term (less than one day) and affect very few individual fish. Steelhead and salmon that are exposed to the increased turbidity will likely move relatively short distances to similar habitat to escape the plume so effects should be minor.

2.5.1.4 Chemical Contamination

Equipment operating near and over the river channel within the action area may be a source of chemical contamination. There is the potential for accidental spills of petroleum products or other hazardous materials into the river from this equipment. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons, which can kill salmon at high concentrations, and can cause sublethal, adverse effects at lower concentrations (Meador et al. 2006). Development and implementation of best management practices (BMPs) using the 2019 Stormwater Management Manual for Eastern Washington (WDOE 2019) that include containment measures and spill response for construction-related chemical hazards will significantly reduce the likelihood for chemical releases within the action area. Based on recent experience, when action agencies implement appropriate BMPs the risk of a spill and exposure is small. Project proponents will implement BMPs to minimize the risk of a spill occurring and minimize the consequence of a spill (through appropriate spill response) so that the risk of injury or death of salmonids is negligible.

2.5.1.5 Sedimentation/Substrate/Forage

Proposed activities will require approximately 37 cubic yards of in-water dredging over a 441 square foot area of the channel. All excavated material from the dredging will be loaded in dump trucks and disposed of away from the channel.

Forage quantity for juvenile fish may be temporarily reduced within the immediate in-water work area as benthic organisms become disturbed by sheet piling installation and removed altogether by dredging. Cover provided by larger substrates within the work area would also be inaccessible to juvenile fish during construction. However, it is expected that few, if any, individual juvenile fall Chinook salmon would be present in the work area during the work window and fish that were present would flee to nearby similar habitat once construction activities commenced. Recolonization of benthic organisms will likely occur within several months after project completion (Fowler 2004; Griffith and Andrews 1981; Harvey 1986; Harvey and Lisle 1998).

Installation of the new sheet pile wall will result in a loss of 28 feet of near-shore habitat, as the sparsely vegetated bank will be replaced with the sheet pile wall. Given that this area has low habitat quality and an abundance of similar type habitat is nearby, the long-term loss of this area is negligible.

2.5.1.6 Sound/Pressure

Pile-driving will create short-term hydroacoustic disturbance to any juvenile or adult salmon or steelhead present in the action area. Pile-driving increases sound pressure levels and noise during construction. The project entails pile-driving to install the 28-foot sheet pile wall along the bank using approximately fifteen sheets of Z sheet pile. Installation will occur with a vibratory pile-driver and will likely be completed in one day. Sheet-pile driving is estimated to take up to eight hours; approximately four hours will entail setup so the cumulative duration of peak underwater noise from pile-driving is anticipated to be up to four hours from vibratory driver installation.

Fishes with swim bladders (including salmonids) are sensitive to underwater impulsive sounds (i.e., sounds with a sharp sound pressure peak occurring in a short interval of time). As the pressure wave passes through a fish, the swim bladder is rapidly compressed due to the high pressure, and then rapidly expanded as the "under-pressure" component of the wave passes through the fish. Injuries resulting from compression and decompression from a sound pressure pulse are known as barotrauma (Halvorsen et al. 2012; Popper et al. 2019). Injuries from intense or continuous underwater sound pressure can include damage to the auditory system. This can result in a temporary or permanent loss of hearing known as either a "temporary threshold shift" (Carlson et al. 2007) or a long-term "permanent threshold shift" (Liberman 2016). The level of injuries can vary based on the intensity and characteristic of the high pressure, distance to the pressure source, and the size and species of the fish (Hastings and Popper 2005; CalTrans 2020). Barotrauma injuries can include external and internal damage including bulging eyes, ruptured organs and swim bladders, hemorrhaging and death (Brown et al. 2009; Brown et al. 2012; Halvorsen et al. 2012). Fish respond differently to sounds produced by impact drivers than to sounds produced by vibratory drivers. Vibratory drivers produce a more rounded sound pressure wave with a slower rise time. Because the more rounded sound pressure wave produced by vibratory drivers produces a slower increase in pressure, the potential for injury and mortality is reduced.

NMFS' current pile driving thresholds for "physical injury" to fish include a peak pressure of 206 decibels (dB) and an accumulated sound exposure level of 187 dB for fish greater than 2 grams, and 183 dB for fish less than 2 grams. Vibratory pile driving rarely exceeds injury levels; peak sound levels can exceed 150 dB, however, the increase in dB is relatively slow causing nearby fish to flee rather than habituate to these sounds, even after exposure (Dolat 1997; Knudsen et al. 1997, as cited in NMFS 2008). Fish that do flee from sound pressure may be exposed to predators and/or be displaced from preferred habitat. Therefore, a 150-dB root mean square "harassment" threshold is applied for potential behavioral effects. Peak sound levels generated by sheet-pile driving for this action were estimated to be 160 dB, and we expect behavioral effects to fish up to 152 feet away from the vibratory driving. Therefore, we anticipate that fish within the enclosed inlet may experience short-term behavioral modifications (e.g. reduced feeding success) and increased risk of predation. Very low densities of rearing juvenile salmonids and adult steelhead are expected to be present in this stretch of the Snake River and exposed to this potential effect, and the small number of fish that do get displaced will likely flee to adjacent habitat with similar quality so minimal effects to displaced fish are anticipated. NMFS does not believe that this response to vibratory driving will result in immediate direct injury or death to juvenile fall Chinook salmon or adult steelhead.

2.5.1.7 Intake Entrainment/ Impingement During Fish Screen/Water Pumping Operations

The project includes installing a new 42-inch-diameter intake pipe and two 42-inch-wide by 86-inch-long rotating barrel screens that will extend out approximately 8 feet from the pump station into a man-made bay of the Snake River. The screened intake pipes (total area 96 ft^2) will be secured to steel plates that are dropped into vertical slots on the river side of the concrete sump pump inlet structure. The new pump station intake has the capacity to pump at a rate of

60.2 cubic feet per second (cfs) however, the Snake River Orchard's water right (51.8 cfs) is below the maximum pump capacity. The new screens are designed to meet the 2022 NMFS fish passage criteria (NMFS 2022e). Potential injury or mortality of fish at the existing screens during the irrigation season is likely part of the environmental baseline. The new intake pipe and fish screens meeting NMFS fish passage criteria will minimize injury or mortality of listed salmonids. We expect the new screens' designs will reduce the current risk of potential entrainment and impingement to listed juvenile salmon and steelhead compared to the current existing screens. However, it will not completely eliminate the potential risk to juvenile salmon or steelhead from injury, or being killed if present in front of the fish screens and intake during pumping operations.

Adult salmonids and most juvenile salmonids in the vicinity of the intakes and screens will likely volitionally swim away from the area and avoid injury or death from entrainment and impingement at the front of the intake screens and pumps. Subyearling spring/summer and fall Chinook salmon and juvenile steelhead are the most likely to be exposed to effects during rearing or migrating in the shallow waters (up to 15 feet deep) near the project site. Smaller juvenile fish or smolts present at the immediate front of the intake and screen are more vulnerable to the effects of potential entrainment or impingement and may be injured or killed. Considering the low quality of habitat in the man-made bay, we expect only a few individual juvenile fall and spring/summer Chinook salmon, sockeye salmon, and steelhead of any of the populations could potentially be exposed to pump operations each year. Exposed fish may be injured or killed if they are unable to flee from in front of the intake structures. Because only a few fish are expected to be exposed and potentially injured or killed each year, we do not expect meaningful reductions in abundance or productivity of any population of ESA-listed salmon or steelhead considered in this opinion.

2.5.2. <u>Effects to Critical Habitat</u>

The critical habitat PBFs most likely to be affected are substrate, water quality, forage, and safe passage.

2.5.2.1 Substrate

Approximately 441 square feet of near-shore, shallow-water benthic habitat will be disrupted by dredging the artificial bay. Approximately 37 cubic yards of substrate will be dredged and hauled away. Increased turbidity from project activities will result in sediment deposition; however, the sediment suspended will likely settle out in the bay itself. Water velocities are relatively low in the action area and the silt curtain is expected to confine the turbidity to the bay. Sediment deposition in the bay has the potential to adversely affect primary and secondary productivity (Spence et al. 1996) for a short time period during and immediately following in-water work. Excess fine sediment in the action area is expected to occur over a small area confined by the silt curtain. The scale of impact will be minimal relative to the rearing habitat in the action area, and will not meaningfully change the conservation value of the substrate PBF.

2.5.2.2 Water Quality

The proposed action will have a short-term (3 days) negative effect on water quality by increasing suspended sediment and turbidity during construction and upon removal of the silt curtain. Suspended sediments are expected to be released as a result of the dredging and sheet-pile driving and turbidity levels in the enclosed work area will increase. Dredging is expected to be completed in four hours and sheet pile driving will take approximately eight hours. During and immediately following these activities, turbidity will be isolated to the bay where in-water work will occur. We anticipate the suspended sediment will quickly settle back down to the riverbed within a day after disturbance. Sediment trapped by the silt curtain will become suspended during the removal process. The suspended sediment is expected to increase turbidity up to 250 feet downstream of the work area for a short period of time.

The use of heavy equipment and concrete washout may result in very small amounts of pollutants entering waterways as discussed previously. However, proper implementation of various BMPs (e.g., storage of fuels or lubricants and refueling of equipment in designated areas, concrete handling and washout areas, etc.) will reduce the risk of contaminants entering the Snake River. Through the use of these measures, it is unlikely chemical contamination will have more than a minimal effect to water quality. Given the proposed BMPs, NMFS believes that the effects to water quality will not meaningfully decrease the function of this PBF in the action area.

2.5.2.3 Forage

The proposed action will have a short-term negative effect on benthic macroinvertebrates by crushing, covering, or displacing them during dredging an area of approximately 631 square feet. We expect nearby benthic macroinvertebrates will begin to recolonize within several days to weeks, and will fully recolonize the area within a few months after project completion (Fowler 2004; Griffith and Andrews 1981; Harvey 1986; Harvey and Lisle 1998). The alteration of this amount of habitat could have some localized effects to forage for out-migrating and rearing juvenile salmonids and steelhead that use this nearshore area during construction, and for up to several months after project completion. However, we do not anticipate the localized reduction in available forage will have a long-term impact to the quality of habitat. Given the size of the reservoir, the amount of available local nearshore habitat, and the short-term nature of the effect, NMFS does not anticipate that this project will change the conservation value of the forage PBF.

2.5.2.4 Safe Passage

The proposed action will not alter PBFs for passage, except during the few days where the silt curtain is installed when dredging and installing the sheet-pile. This construction will occur at a time when very few fish of any species will be migrating either upstream or downstream and will occupy only a small footprint, around which migration in either direction will be unimpeded. Fish present in the action area will likely be impeded from migrating through or utilizing the habitat within the area during times of active construction; installing the silt curtain will likely cause any fish present to flee the area. Once the silt curtain is deployed, any fish not hazed from the active construction area may become trapped in the area until the curtain is removed. The action will not appreciably alter the safe passage PBF after construction.

2.5.3. Summary of Effects

Based on the species life stages and the activities described above, the proposed project is likely to result in short-term adverse effects to yearling fall Chinook salmon within the action area from deployment of the silt curtain, entrainment/impingement by equipment, and displacement due to hydroacoustic impacts. In addition, long-term operation of the pumping system may cause injury or mortality to all juvenile ESA-listed species due to entrainment/impingement on the new screens.

As described above, the proposed action will have adverse effects on substrate, water quality, forage, and safe passage PBFs during in-water work and for several days following the work. The function of these PBFs will return following construction. Therefore, the proposed action will not reduce the conservation value of critical habitat in the action area.

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 and 402.17(a)]. 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 versus cumulative effects.

During this consultation, NMFS searched for information on future State, tribal, local, or private actions that were reasonably certain to occur in the action area. Irrigation of farmlands contributes to large amounts of in-stream water withdrawals throughout the basin. Applications of pesticides and chemicals for agricultural production contribute to pollutant inputs and accumulate to degrade water quality. Additional effects to ESA-listed salmonid and steelhead are anticipated with population growth, urban development, and increases in recreational use of the Snake River. The population of Walla Walla County, Washington, grew 6.4 percent from 2010 to 2021. NMFS assumes the population for Walla Walla County, as well as surrounding counties, will continue to grow for the foreseeable future. As the human population in the action area grows, demand for agricultural, commercial and residential development, and recreation is likely to increase as well. Industrial and commercial developments often contribute to increases in shoreline riprap, altered landscapes and increases in impermeable surfaces. The effects of new development are likely to reduce the conservation value of the habitat within the action area. However, the magnitude of the effect is difficult to predict and is dependent on many social and economic factors. NMFS is not aware of any specific future non-Federal activities within the action area that would cause greater effects to a listed species or designated critical habitat than presently occur.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step assessing the risk that the proposed action poses to species and critical habitat. 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 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 diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

The environmental baseline is characterized by degraded floodplain and channel structure, altered sediment routing, altered hydrology, and altered water quality. Adjacent to the action area the major sources of impacts to salmon and steelhead, are hydropower dam systems as well as the continued development and maintenance of the shoreline including marinas, docks, roads, railroads, and riprap. Dams and reservoirs within the migratory corridor have altered the river environment and affected fish passage. The operation of water storage and withdrawal projects has altered the natural hydrograph of the Snake River. Water impoundment and dam operations affect floodplain development and water quality characteristics. Salmon and steelhead are exposed to high rates of natural predation during all life stages from fish, birds, and marine mammals. Avian and introduced fish predation on salmonids has been exacerbated by environmental changes associated with river developments. Shoreline development has reduced the quality of nearshore salmon and steelhead habitat by eliminating native riparian vegetation, displacing shallow water habitat with fill materials and by further disconnecting the Snake River from historic floodplain areas. Further, riparian species that evolved under the environmental gradients of riverine ecosystems are not well suited to the present hydraulic setting of the action area (i.e., static, slack water pools), and are thus often replaced by non-native species. The riparian system provides inadequate protection of habitats and refugia for sensitive aquatic species. The cumulative effects of state and private actions within the action area are anticipated to continue to have negative effects on ESA-listed salmonids.

Climate change is likely to affect the abundance and distribution of the ESA-listed species considered in the opinion. The exact effects of climate change are both uncertain, and unlikely to be spatially homogeneous and the ability of listed-species to adapt is uncertain. Most of the effects of the action are short term, and thus will not exacerbate the effects on species and habitat caused by climate change. The long-term effects of impingement at the new screen is likely to be small as long as the screen is maintained, and this effect will not be altered by climate change. There is no change in the amount of water withdrawn by this action and flows in the Snake River will continue to be controlled by hydropower operations into the future.

2.7.1. Species

The action area is used by SR sockeye salmon, SRB steelhead, SR spring/summer-run Chinook salmon, and SR fall-run Chinook salmon. SR sockeye salmon are listed as endangered and have an overall viability rating of high risk. The other three species are listed as threatened, and while some populations are viable, most populations within these ESU/DPSs remain at moderate or high risk.

NMFS anticipates the proposed action will affect primarily fall Chinook juveniles within the active in-water work area. Smaller juvenile fish that are less likely to flee and could be killed or injured by working equipment (i.e., impingement), and harmed by exposure to sound/pressure produced by vibratory pile driving and/or exposure to high levels of turbidity. The work area is relatively small and will affect only a few individuals of any population. SRB steelhead are likely to be the only adults of the listed species in the Ice Harbor pool during the winter work window; but, they are highly likely to avoid the disturbance caused by the construction. Juvenile fall Chinook salmon and adult steelhead are migrating or holding in the reservoir in the winter, and the avoidance behaviors are not expected to reduce their fitness because there is other similar habitat in the immediate vicinity.

In addition to these short-term effects, there are likely to be long-term consequences of the proposed action. The screens on the new intake pipe will comply with NMFS' screening criteria to prevent entrainment of juveniles into the pipe. However, even with proper maintenance a small number of juveniles from the four listed species may become impinged or scrape along the screen, which could result in injury or death.

Considering the effects of the action in conjunction with the existing condition of the environmental baseline and the small level of potential cumulative effects, NMFS has determined that the loss of a very small number of juvenile salmon and steelhead that may be caused by the proposed action will not be substantial enough to negatively influence VSP criteria at the population scale. Because the effects will not be substantial enough to negatively influence VSP criteria at the population scale, the viability of MPGs, ESUs, and DPS are also not expected to be reduced. The effects of the proposed action are not likely to appreciably reduce survival of any of the four species considered in this opinion, nor is the action likely to reduce the likelihood of recovery of these species.

2.7.2. Critical Habitat

The proposed action has the potential to affect several PBFs within the action area. Those PBFs include water quality (turbidity, and chemical contamination), substrate, safe passage, and forage. The primary effects of the action will be short-term, localized increases in background turbidity and minor alterations of the substrate. NMFS expects minor effects to the above PBFs from the reduced water quality, temporary disturbance of the substrate and shallow-water benthic habitat, which will cause a temporary change to prey availability in the disturbed area. It is reasonably certain that these actions will not result in long-term adverse effects to substrates, water quality, migratory habitat, food base, or other PBF's within the action area given the proposed conservation and mitigation measures discussed above. The proposed project actions are not expected to result in any net change in function of the in-stream habitat.

Benthic disturbance in the dredging area will reduce prey availability. The prey invertebrates will start to recolonize as soon as construction is done. Recolonization will occur over a couple of months. The disturbed area is a small fraction of similar quality, shallow habitat area available for use in the Ice Harbor pool.

Based on our analysis that considers the current status of PBFs, adverse effects from the proposed action will cause a minor, temporary, and localized decline in the quality and function of PBFs in the action area. Because of the small scale and extent of the effects to PBFs, we do not expect a reduction in the conservation value of critical habitat in the action area. As we scale up from the action area to the designation of critical for each species, the proposed action is not expected to appreciably reduce the conservation value of the designated critical habitat.

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, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of SR sockeye salmon, SR spring/summer Chinook salmon, SR fall Chinook salmon, SRB steelhead, or destroy or adversely modify their respective 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 further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include but are not limited to, breeding, feeding, or sheltering." "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 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 opinion, NMFS determined that incidental take is reasonably certain to occur as follows: (1) behavioral changes due to sound pressure from sheet pile driving; (2) mechanical injury or death from in-water work equipment; (3) behavioral effects from increased turbidity; and (4) injury or death of fish from impingement/entrainment on fish screens/intake structure over the life of these facilities. NMFS is reasonably certain the incidental take described here will occur because: (1) recent and historical surveys indicate ESA-listed species are known to occur in the action area; and (2) the proposed action includes in-water activities that are reasonably certain to harm or kill juvenile steelhead and salmon.

2.9.1.1 Incidental Take from Sound/Pressure

NMFS expects the proposed action will temporarily displace yearling fall Chinook salmon by exposure to hydroacoustic sound/pressure during vibratory pile-driving activities. Salmon experience behavior modifications (harm) through reduced feeding success and altered migration from avoiding elevated sound pressure during vibratory pile driving. The modifications may result in reduced fitness and survival to any yearling fall Chinook salmon present. Estimating the specific number of animals harmed by pile driving is not possible because of the range of responses that individual fish will have, and because the numbers of fish present, is highly variable. While this uncertainty makes it impossible to quantify take in terms of numbers of animals injured or killed, the duration of the pile-driving activities, to which fish will be exposed is readily discernible and presents a reliable measure of the extent of take that can be monitored and tracked. Therefore, the duration of vibratory pile-driving (excess of 8 hours) represents the extent of take associated with hydroacoustic sound/pressure during pile-driving activities. The proposed surrogate is linked to anticipated take because it described conditions that will cause take due to fish experiencing behavioral modifications during the in-water pile installation activities. Specifically, NMFS will consider the extent of take exceeded if construction includes over 8 hours of vibratory pile driving.

2.9.1.2 Incidental Take from Mechanical Injury or Death

NMFS anticipates the proposed action will result in injury or death as a result of in-water dredging. Estimating the specific number of animals injured or killed by interactions with heavy equipment is not possible because of the range of responses that individual fish will have, and because the numbers of fish present at any time is highly variable. While this uncertainty makes it impossible to quantify take in terms of numbers of animals injured or killed, the extent of habitat altered by dredging and installation of the in-water pipeline is readily discernible and presents a reliable measure of the extent of take that can be monitored and tracked. Therefore, the estimated extent of habitat encompassed by in-water dredging represents the extent of take associated with mechanical injury and death. The proposed surrogate is causally linked to anticipated take because it describes conditions that will cause take due to in-water work. Specifically, NMFS will consider the extent of take exceeded if the limits of dredging and filling exceed 500 square feet.

2.9.1.3 Incidental Take from Turbidity

NMFS anticipates the proposed action will result in harm to fish by increasing turbidity: (1) in the enclosed area as a result from dredging; and (2) in the Snake River up to 250 feet downstream of the work area when the silt curtain is removed. Estimating the specific number of fish harmed from turbidity is not possible because the number of fish present at any time is highly variable and there is relatively little data available on fish densities in the Ice Harbor pool. While this uncertainty makes it impossible to quantify take in terms of numbers of fish injured or killed, the duration of dredging and linear extent of the turbidity plume are readily discernible and presents reliable surrogate measures of the extent of take that can be monitored and tracked. Therefore, the estimated duration of dredging and the downstream extent of a turbidity plume represent the extent of take associated with turbidity. Specifically, NMFS will consider the extent of take exceeded if: (1) the dredging exceeds eight hours; and (2) if upon removal of the silt curtain, a visible turbidity plume extends beyond 250 feet.

2.9.1.4 Incidental Take from Entrainment or Screen Impingement

NMFS anticipates the proposed action will result in injury or death as a result of entrainment or impingement at screens at the intake pump station over the many years of presence and operation of these structures. Estimating the specific number of animals injured or killed at intake screens is not possible because of the range of responses that individual fish will have, and because the numbers of fish present at any time is highly variable. While this uncertainty makes it impossible to quantify take in terms of numbers of animals injured or killed, the rate of water withdrawal at the intake screens is readily discernible and presents a reliable surrogate measure of the extent of take that can be monitored and tracked. Therefore, the estimated rate of the water withdrawal while pumping at the intakes represents the extent of take associated with entrainment or impingement. Specifically, NMFS will consider the extent of take exceeded if the pumping rate exceeds 51.8 cfs.

The surrogates described above are measurable, and thus can be monitored and reported. For this reason, the surrogate's function as effective reinitiation triggers.

2.9.2. Effect of the Take

In the 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

"RPMs", are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

The COE shall:

1. Avoid or minimize take from sound/pressure.
2. Avoid or minimize take from habitat disturbance and mechanical injury.
3. Avoid or minimize take from increased turbidity.
4. Avoid or minimize take from injury or death from entrainment or impingement.
5. Conduct sufficient monitoring to ensure that the project is implemented as proposed, and the amount and extent of take is not exceeded.

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The COE 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 RPM 1:

   a. Implement soft-start procedures to provide a warning and/or give species near sheet pile installation activities a chance to leave the area prior to a vibratory hammer operating at full capacity.
   b. A soft-start procedure will be used at the beginning of in-water piling installation, or any time piling installation has ceased for more than 30 minutes.
   c. The contractor will initiate noise from vibratory hammers for 15 seconds at reduced energy followed by a 30-second waiting period. The procedure shall be repeated two additional times.

2. The following terms and conditions implement RPM 2:

   a. Conduct all work below the OHWM within as short a period as possible between late December and February 28.
   b. Confine dredging to the minimum area necessary to achieve project goals, no larger than 500 square feet.

3. The following terms and conditions implement RPM 3:

   a. Complete dredging in eight hours or less.
   b. Follow the manufacturer's instructions for silt curtain removal and, to prevent resuspension, carefully and slowly pull the curtain towards an obstruction free area near the pump station.
   c. After removing the silt curtain, visually monitor the turbidity plume twice daily until the plume is no longer visible to confirm the plume does not exceed beyond 250 feet of the work site.

4. The following terms and conditions implement RPM 4:

   a. All intake pumps and diversions shall be maintained and operated in accordance with NMFS' current fish screen criteria (NMFS 2022e).
      (1) Using section 8.11 of the NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual (NMFS 2022e), develop an operations and maintenance plan and submit to NMFS for approval two months after project completion.

5. The following terms and conditions implement RPM 5:

   a. Track and monitor construction activities to ensure that the conservation measures are meeting the objective of minimizing take.
   b. Submit a completion of project report to NMFS two months after project completion. The completion report shall include, at a minimum, the following:

(1) Starting and ending dates for work completed, with in-water work period specified.
(2) Details of total footprint of disturbed area during in-water dredging and installation of pipeline to ensure meeting the extent of take requirements.
(3) Summary and details of turbidity monitoring including:
    (a) Any daily observed turbidity plume from the in-channel work area to 500 ft. downstream during the in-water construction period. Observations shall occur daily before, during and after commencement of construction activities and compared to observable upstream turbidity.
    (b) Description of the visually monitored downstream extent of turbidity plumes resulting from in-water construction and dredging activities, including removal of the sediment curtain.
(4) Photos of habitat conditions (open water including sediment control measures, shoreline, banks, vegetation, etc.) at the in-water work site before, during, and after project completion. General views and close-ups showing details of the project and project area, including pre- and post-construction. Label each photo with date, time, project name, photographer's name, and the subject.
(5) Number and species of any observed injured or dead listed salmon or steelhead found at the in-water work site.

All reports will be sent to: nmfswcr.srbo@noaa.gov

Reference to NMFS consultation number WCRO-2022-01268.

c. If the amount or extent of take is exceeded, stop project activities and notify NMFS immediately.

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).

The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the federal action agency:

1. Work with Snake River Orchards and other water users in the Snake River basin, including landowners, on long-term plans and designs to improve water use and efficiency, and to upgrade and modify other existing pump stations and intakes to prevent injury to fish and aquatic resources.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Snake River Orchard Pump Station Improvements.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) if the amount or extent of incidental taking specified in the ITS is exceeded; (2) if new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the opinion or written concurrence; or (4) if a new species is listed or critical habitat designated that may be affected by the identified 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. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). 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) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)]

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

3.1. Essential Fish Habitat Affected by the Project

The action area, as described in Section 2.3 of the above opinion, is also EFH for various life-history stages of Chinook and coho salmon (PFMC 2014). The PFMC designated the following five habitat types as habitat areas of particular concern (HAPCs) for salmon: complex channel and floodplain habitat, spawning habitat, thermal refugia, estuaries, and submerged aquatic vegetation (PFMC 2014). The proposed action may adversely affect the following HAPCs: complex channel and floodplain habitat.

3.2. Adverse Effects on Essential Fish Habitat

Based on information provided in the BA and the analysis of effects presented in Section 2 of this document, NMFS concludes that the proposed action will adversely affect EFH designated for Chinook and coho salmon because it will have effects on water quality, benthic communities, and channel substrate.

The proposed project includes dredging of channel substrate and installation of new intake pipes and screens. This will alter approximately 441 square feet (0.02 acres) of river bottom, altering benthic habitat and macroinvertebrate production. This action will result in short-term effects to water quality and feeding habitat for juvenile salmon.

Specifically, NMFS has determined that the action will adversely affect EFH as follows:

1. The temporary alteration of the near-shore environment substrate, which will temporarily (during construction) affect juvenile rearing and the quality of habitat in the migration corridor.
2. Temporary reduction in prey availability from removal and disturbance of the macroinvertebrate community and as a result of increased fine sediment in stream substrates due to in-water work.
3. Short-term elevation of turbidity and sedimentation within and immediately downstream from the project area from construction activities.

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following EFH Conservation Recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

1. The COE should conduct all work below the OHWM within as short a period as possible between late December and February 28.
2. The COE should confine dredging to the minimum area necessary to achieve project goals, no larger than 500 square feet.
3. The COE should complete dredging in eight hours or less.
4. The COE should follow the manufacturer's instructions for silt curtain removal and, to prevent resuspension, carefully and slowly pull the curtain towards an obstruction free area near the pump station.

Fully implementing these EFH Conservation Recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, for Pacific Coast salmon EFH.

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the COE 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 timeframes for the Federal agency response. The response must include a description of the 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 COE 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 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 the COE. Other interested users could include citizens and officials of the city of Lewiston and the Nez Perce Tribe. Individual copies of this opinion were provided to the COE. The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). The format and naming adhere 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 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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