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-2023-01082

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June 25, 2024

Todd N. Tillinger, P.E.
Chief, Regulatory Branch
Seattle District, U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, WA 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Legrow Water Company Water Supply Relocation Project, Walla Walla County, Washington.

Dear Mr. Tillinger:

Thank you for your letter of June 29, 2023, requesting initiation of consultation with the 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 Legrow Water Company's water supply relocation project on the Columbia River near the City of Wallula, Walla Walla County, Washington.

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

After reviewing the current status of the species, the environmental baseline, the effects of the proposed action, and the cumulative effects, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Upper Columbia River (UCR) spring-run Chinook salmon (*Oncorhynchus tshawytscha*), Snake River (SR) spring-run Chinook salmon, SR fall-run Chinook salmon, UCR steelhead (*O. mykiss*), SRB steelhead and Middle Columbia River (MCR) steelhead. NMFS also determined the action will not destroy or adversely modify designated critical habitat for these species and for SR sockeye salmon (*O. nerka*). We provide rationale for our conclusions in the attached biological opinion (opinion). The enclosed opinion is based on information provided in your biological assessment and other sources of information cited in the opinion. This opinion focuses on the relocation of the existing water supply facility, and does not address the effects of operation and maintenance of the new facility.

As required by section 7 of the ESA, NMFS provided an incidental take statement (ITS) with the opinion. The ITS includes reasonable and prudent measures that NMFS considers necessary or appropriate to minimize incidental take associated with the proposed action. The take statement sets forth terms and conditions, including reporting requirements that the U.S. Army Corps of Engineers, and any person who performs the action, must comply with to carry out the reasonable and prudent measures. Incidental take from the proposed action that meets these terms and conditions will be exempt from the ESA take prohibition.

Please contact Scott Carlon (971.322.7436 or scott.carlon@noaa.gov) if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

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

Enclosure

cc: David Moore, U.S. Army Corps of Engineers

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

Water Supply Relocation Project, Legrow Water Company, Walla Walla County, Washington

NMFS Consultation Number: WCRO-2023-01082

Action Agency: U.S. Army Corps of Engineers, Seattle District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	If likely to adversely affect, Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	If likely to adversely affect, is Action Likely to Destroy or Adversely Modify Critical Habitat?
Upper Columbia River spring-run Chinook salmon (*Oncorhynchus tshawytscha*)	Endangered	Yes	No	Yes	No
Snake River spring/summer-run Chinook salmon (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Snake River fall-run Chinook salmon (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Upper Columbia River steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Snake River steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Middle Columbia River steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Snake River sockeye salmon (*O. nerka*)	Endangered	-	-	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, Ph.D.
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Date: June 25, 2024

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

GLOSSARY OF ACRONYMS

BA	Biological Assessment
BMP	Best Management Practice
CHART	Critical Habitat Review Team
Corps	U.S. Army Corps of Engineers
dB	decibels
DDE	Dichlorodiphenyldichloroethylene
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR	Federal Register
HDPE	High-density Polyethylene
ICRD	Interior Columbia Recovery Domain
ICTRT	Interior Columbia Basin Technical Recovery Team
ITS	Incidental Take Statement
kHz	kilohertz
MCR	Middle Columbia River
MPG	Major Population Group
NMFS	National Marine Fisheries Service
NTU	nephelometric turbidity units
NWFSC	Northwest Fisheries Science Center
PAH	polycyclic aromatic hydrocarbon
PBF	physical or biological feature
PCB	Polychlorinated Biphenyl
PCE	primary constituent element
RM	River Mile
RMS	root mean square
RPM	Reasonable and Prudent Measure
SPCC	Spill Prevention, Control, and Countermeasure
SR	Snake River
SRB	Snake River Basin
SWPP	Storm Water Pollution Prevention
TESC	Temporary Erosion and Sediment Control
UCR	Upper Columbia River
uPA	micropascal
VSP	Viable Salmonid Population

1. INTRODUCTION

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

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 402. We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR part 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 two weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). A complete record of this consultation is on file at NMFS' Columbia Basin Branch in Ellensburg, Washington.

1.2. Consultation History

NMFS received the U.S. Army Corps of Engineers (Corps) request for consultation for the Legrow Water Supply Relocation Project (Project) on June 29, 2023. Consultation was initiated on that date. The request included a biological assessment (BA) prepared by David Evans and Associates for the Legrow Water Company (DEA 2023). The proposed Project is located at roughly river mile (RM) 318 on the Columbia River near Attalia, Walla Walla County, Washington.

In their BA, the Corps determined that their authorization of Legrow Water Company's relocation of an existing irrigation pump station, intake pipes, and fish screens in the Columbia River near Attalia, Washington, would adversely affect Upper Columbia River (UCR) spring-run Chinook salmon (*Oncorhynchus tshawytscha*), Snake River (SR) spring-run Chinook salmon, SR fall-run Chinook salmon, UCR steelhead (*O. mykiss*), SRB steelhead, Middle Columbia River (MCR) steelhead, and SR sockeye salmon (*O. nerka*) and would adversely affect their critical habitat. On June 20, 2024, the Corps revised their request for consultation because neither juvenile nor adult SR sockeye salmon are likely to be present in the action area during project activities and thus are no longer considered in this consultation. The opinion does analyze the affects to critical habitat for SR sockeye salmon because the proposed action will alter habitat that sockeye salmon will experience during their life cycle.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

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). Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910). The Corps proposes to permit the project under section 404 of the Clean Water Act. The project may also require authorization under Section 14 of the Rivers and Harbors Act of 1899, as codified at 33 U.S.C. Section 408 (Section 408).

The Corps proposes to authorize the Legrow Water Company's relocation of an existing irrigation pump station, intake pipes, and fish screens in the Columbia River near Attalia, Washington. The existing pump station intake is in a sediment deposition area and requires annual dredging to keep the intake clear and maintain properly functioning fish screens. Additionally, the intake pipe and pump station have reached the end of their useful life. The river bottom at the proposed new location, approximately 450 feet north of the existing station and further out into the channel, is more stable and not subject to significant sediment deposition. Water withdrawal at the proposed new location will be the same volume and rate of withdrawal as at the existing location.

The proposed project area is located between the left bank (looking downstream) of the Columbia River and Badger Island (about RM 317.5) (Figure 1), which is located between the confluences of the Snake River and Walla Walla River.

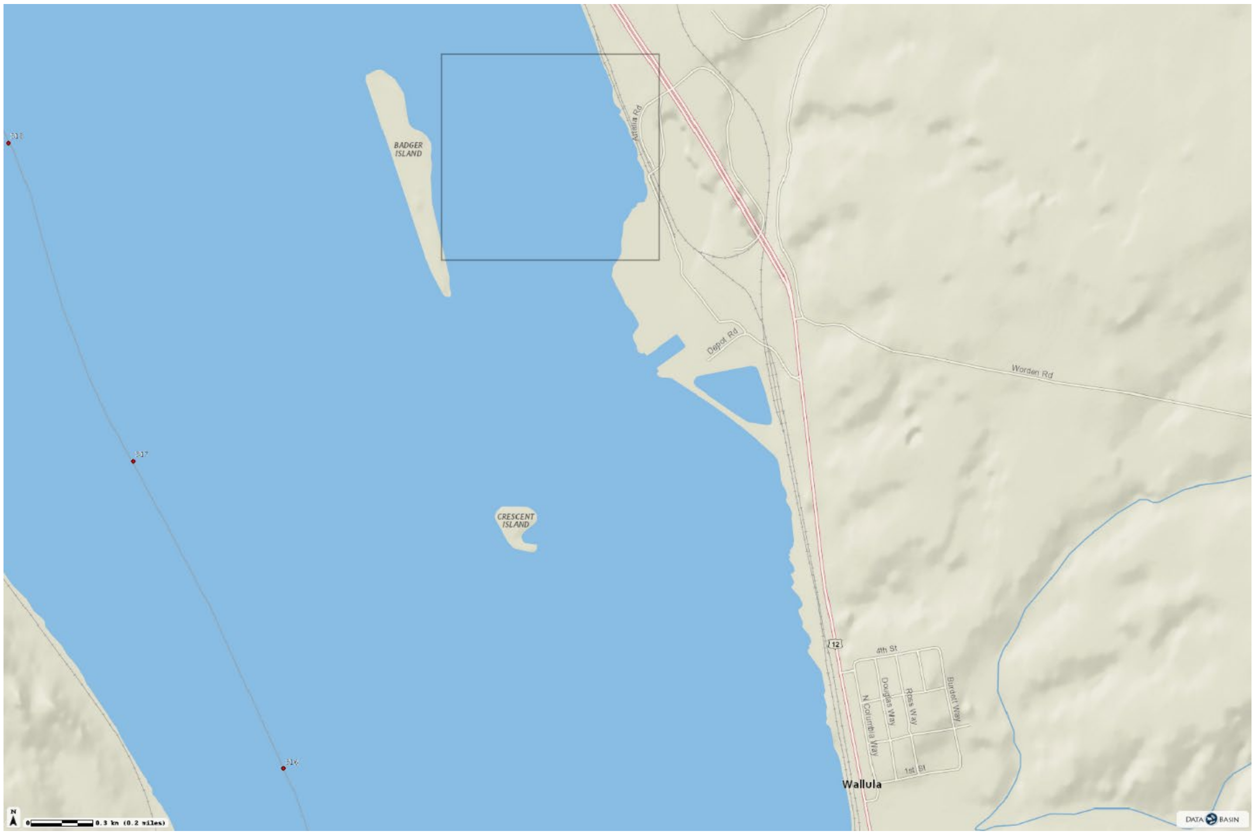

Figure 1. General project area located within the square.

1.3.1. Project Overview

The proposed action is described in detail in Section 2, Project Description (pages 3–13), of the BA. We incorporate Section 2 of the BA (DEA 2023) by reference into this consultation. In short, the proposed action is to relocate 15 existing irrigation intake fish screens to a new upstream location and attach the screens to three new 60-inch-diameter, 3,157-linear-foot-long pipes in the Columbia River. Up to 9,271 cubic feet of sediment will be hydraulically dredged (with upland disposal) over 88,527 square feet, and up to 1,220 cubic yards of fill will be placed over 3,316 square feet of river bottom to accommodate the new screens and pipe assembly, and up to 44,472 square feet of new structural area, including pipes, anchors, and conduit, will be placed within the river. Up to 24, 12-inch-diameter steel piles will be driven to anchor with a vibratory hammer. The new pipeline assembly and a temporary sheet pile wall will be placed over 1,515 linear feet of the river bottom. All work in the water will be carried out from December 1 through February 28. Two in-water work seasons will be necessary to complete the proposed action.

While the in-water work is carried out, upland boring beneath the railroad tracks will begin from the landward side of the tracks and be completed on the river side of the tracks inside of the cofferdam. Three 72-inch-diameter casings will be installed beneath the tracks and into cofferdam. Three 60-inch-diameter steel carrier pipes will be installed through the casings. Flanges will be welded to the carrier pipes on the river side of the casing to facilitate connection to the three pipes running to the intake screens. A 24-inch-diameter casing will also be installed beneath the railroad for installation of two electrical conduits with conductors that will provide power for the intake screen cleaning systems.

1.3.1.1. Excavation and Construction

A temporary sheet pile and clean rock fill cofferdam will be constructed on shore and nearshore where the pipes and casings that pass under the railroad tracks enter the river. The cofferdam will extend roughly 125 feet into the river. Using a hydraulic dredge, approximately 2,640 cubic yards of material will be removed in order to fully close the cofferdam. Dredge spoils will be disposed of at an upland location. After dredging, the cofferdam will be closed and turbidity allowed to settle. Fish, if any are present behind the cofferdam, will be salvaged and returned to the river. Following these activities, and after turbidity settles to background levels at the dredge site, water will be pumped out and discharged to the river. Sheet piles will be driven using a vibratory hammer and clean rock fill will be placed by crane from a barge (DEA 2023).

During the in-water work described above, boring underneath the railroad tracks will start at the landward side of the tracks and stop at the river's edge inside of the cofferdam. Three, 72-inch-diameter casings will be installed beneath the tracks and into the cofferdam and three, 60-inch-diameter steel carrier pipes will be installed through the casings. Flanges will be attached to the carrier pipes on the river side of the casing to facilitate connection to the three, 60-inch steel pipes running to the intake screens. One, 24-inch-diameter casing will also be installed beneath the railroad for installation of two electrical conduits with conductors that will provide power for the intake screen cleaning systems (DEA 2023).

To keep the pipes submerged by a minimum of 2 feet during periods of low water elevations, roughly 9,271 cubic yards of material will be removed. The dredging depth will vary from about 5 feet near the riverward side of the cofferdam to nearly 0 ft approximately 1,780 feet from the shoreline. To minimize the volume of dredge material, sheet pile may be installed with a vibratory hammer along the edges of the deeper dredged trench to retain the side slopes. It is expected that the dredge depth for the last 1,210 feet will be minimal so steel pile will not be needed. The material will be removed using a hydraulic dredge and pumped through a pipe and discharged at an upland site. All areas being dredged will be contained by a turbidity curtain to minimize the transport of turbidity and resuspended sediments (DEA 2023).

It is anticipated that three barges—a crane barge, pipe fabrication barge, and a materials barge—will be required to complete the 60-inch pipe installation. Pipe materials will be transported by barge to the site as needed. The three pipes will be fabricated concurrently on the fabrication barge and floated into place. Along with two of the 60-inch pipes, a 4-inch high-density polyethylene (HDPE) electrical conduit with conductors will be installed for operation of the fish screen cleaners.

Following completion of pipe fabrication in the river and the installation of the 70-inch casings and 60-inch carrier pipes onshore, the cofferdam will be opened and flooded. Once flooded, the three pipes will be floated into the area and the shoreward ends sunk and connected to the pipes passing through the casings beneath the railroad. A total of 24, 12-inch-diameter steel piles (8 piles per each 60-inch pipe) will be driven to refusal with a vibratory hammer at 400-foot intervals to hold the pipe in place against the current and wave action until each pipe can be sunk. These piles will be left in place but cut off at the top of the 60-inch pipes when completed (DEA 2023).

The new intake pipes placed over this length will be partially buried near the shoreline to avoid creating an obstruction above the shallow shoreline surface. However, as the pipe continues west into deeper water, the pipeline will become partially buried, then resting on the river substrate, and finally elevated above the river bottom near the intake screens. Sheet piles installed to hold the pipe trench open will be removed after placement of new intake pipes.

At the end of the intake pipes, screen manifolds and intake fish screens will be installed. Up to 24, 12-inch-diameter steel pipe piles will be driven to refusal with a vibratory hammer to anchor and support the manifold piping and intake fish screens. Steel frames will be installed beneath the pipe manifolds and suspended from the piles to support the intake screens inverts 2 feet above the river bottom.

Following construction of the intake screen manifold piping and support framework, the existing intake fish screens will be removed from the existing pipe manifold and installed on the three new pipe manifolds. The existing intake screens are stainless steel wedge wire with 0.069-inch slot openings and 50 percent net open area. The screens have a brush cleaning system driven by a submersible electric motor and gear box (DEA 2023).

The new pump station will be constructed onshore, east of the existing railroad tracks, while all the in-water work is being conducted. After completion of the new intake pipes and screens, the pipe manifold and piles at the existing pump site will be removed and salvaged or disposed of.

The Legrow Water Company may determine to move only a portion of the existing screens, pumps, and electrical equipment from the existing facilities to the new facilities for testing. Once the new facilities are operating properly the remainder of the equipment will be relocated. The number of intake screens and number of pumps moved will be selected to ensure the intake screen approach velocities meet NMFS' fish screen criteria. Where screens are not present on a pipe manifold, temporary blind flanges will be installed to prevent the intake of water.

1.3.1.2. Vegetation Management

Areas to be cleared and excavated for the new pumphouse are vegetated primarily with sage brush, bitter brush, and native grasses. Few mature trees are present within the Project area and none will be removed during the pumphouse relocation. Exposed soils will be stabilized with hydroseeding and native plants. Any exposed soils elsewhere in the Project area with a high risk of erosion will be stabilized with erosion fabric and hydroseeding (DEA 2023).

1.3.1.3. Best Management Practices

Best Management Practices (BMPs) will be implemented, including development of a Temporary Erosion and Sediment Control (TESC) Plan; a Spill Prevention, Control and Countermeasures (SPCC) Plan; and a Storm Water Pollution Prevention (SWPP) Plan. As proposed in the BA (DEA 2023), the following BMPs will be applied:

1. A TESC Plan and a Source Control Plan will be developed and implemented for all projects requiring clearing, vegetation removal, grading, ditching, filling, embankment compaction, or excavation. The BMPs in the plans will be used to control sediments from all vegetation removal and ground disturbing activities.
2. Only the vegetation that obstructs Project construction will be removed. Clearing limits will be delineated with orange barrier fencing wherever clearing is proposed in or adjacent to a stream and wetland or its buffer.
3. Erosion control blankets will be installed on steep slopes that are susceptible to erosion and where ground-disturbing activities have occurred. This will prevent erosion and assist with the establishment of native vegetation.
4. The contractor will designate at least one employee as the Certified Erosion and Spill Control Lead. This lead will be responsible for the installation and monitoring of erosion control measures and maintaining spill containment and control equipment. The Erosion and Spill Control lead will also be responsible for ensuring compliance with all local, State, and Federal erosion and sediment control requirements.
5. Inspect all temporary and permanent erosion and sedimentation control measures on a regular basis. Maintain and repair to assure continued performance of their intended function. Inspect silt fences immediately after each rainfall, and at least daily during prolonged rainfall. Remove sediment as it collects behind the silt fences and prior to the fence's final removal.
6. Where practicable for soil stability, native vegetation and a native seed mixture will be planted in areas disturbed by construction activities.
7. The contractor shall prepare an SPCC Plan prior to beginning construction. The SPCC Plan shall identify the appropriate spill containment materials that will be present on Project site at all times.
8. All equipment to be used for construction activities shall be cleaned and inspected prior to arriving at the project site, to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly.
9. Construction equipment will be inspected daily to ensure there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products. Should a leak be detected on heavy equipment used for the project, the equipment shall be immediately removed from the area and not used again until adequately repaired.
10. Project staging and material storage areas shall be located a minimum of 150 feet from perennial surface waters or in currently developed areas such as parking lots and managed fields.

11. Material that may be temporarily stored for use in Project activities shall be covered with plastic or other impervious material to prevent sediments from being washed from the storage area to surface waters.
12. If necessary, a biologist shall re-evaluate the project for changes in design and potential impacts associated with those changes, as well as the status and location of listed species, every 6 months until project construction is completed.
13. Exposed soils will be stabilized after construction is complete.
14. For projects involving concrete, a concrete truck chute cleanout area shall be established to properly contain wet concrete.
15. All new screens will be installed following the most-recent NMFS-approved fish screen criteria (NMFS 2022f).

1.3.1.4. Conservation Measures

The following measures will be employed to further minimize impacts associated with Project activities:

- In-water work will occur over two seasons between December 1 and February 25, which is a period when the fewest ESA-listed salmonids are expected to be present in the Project area.
- To minimize the transport of turbidity and resuspended sediments, turbidity curtains will surround all areas to be dredged.
- Turbidity and water quality parameters will be monitored during dredging to maintain compliance with Washington State water quality standards.
- All pile driving, whether steel pipe or sheet pile, will be driven by a vibratory pile driver to minimize underwater sound. No impact pile driving will occur.
- Before dredging and dewatering behind the shoreline cofferdam, fish will be salvaged according to the protocols and guidelines established in NMFS (2020a), and relocated to the areas outside of the cofferdam.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would result in a stream restoration action carried out by the Walla Walla County Conservation District and partly funded by the Legrow Water Company as mitigation for the permanent loss of forage habitat in the Columbia River. The proposed stream restoration project would occur in about 1.3 miles of Coppei Creek, a tributary of the Touchet River within the Walla Walla River basin. The Walla Walla River enters the Columbia River about 3.3 miles downstream of the proposed action. The restoration will focus on simplified instream conditions, channel stability, temperature, deficiency of deep pools, and fine sediment contributions from farming and other land use activities. Proposed activities include large woody debris and logjam placement, levee removals, floodplain reconnection, side-channel creation, and riparian plantings. The primary focus of the restoration in Coppei Creek is to address limiting factors for MCR steelhead. In total, the Coppei Creek restoration project will directly affect approximately 4.7 acres of MCR critical habitat. The Legrow Water Company's funding will help address roughly 1 acre of the approximate 4.7-acre restoration project. This is intended to offset the permanent loss of 1 acre of in-water substrate and associated benthic functions in the Columbia River due to the placement of new water intake structures.

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 reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and 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 biological 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 listed species included in this consultation 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 this term with physical or biological feature (PBF). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE 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 is likely to 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 and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species.

2.2.1. Status of the Species

For Pacific salmon and steelhead, we commonly use the four "viable salmonid population" (VSP) criteria (McElhany et al. 2000) to assess the viability of the populations that, together, constitute the species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

Spatial structure refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population.

Diversity refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits (McElhany et al. 2000).

Abundance generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

Productivity, as applied to viability factors, refers to the entire life cycle (i.e., the number of naturally spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany et al. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance", which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany et al. 2000).

In the summary that follows, we describe the status for the evolutionarily significant units (ESU) of UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, and SR fall-run Chinook salmon; and for the distinct population segments (DPS) of SRB steelhead and MCR steelhead. We also describe the status of designated critical habitat for these species and for SR sockeye salmon that occurs within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (FR) (Table 1), applicable recovery plans (NMFS 2009; NMFS 2015; NMFS 2017a and b; UCSRB 2007), the viability analysis prepared by the Northwest Fisheries Science Center (NWFSC) for the status reviews (Ford 2022), and the 2022 status reviews for these species (NMFS 2022a,b,c,d, and e). These additional documents are incorporated by reference and are available on the NMFS West Coast Region website (https://www.westcoast.fisheries.noaa.gov).

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

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon *(Oncorhynchus tshawytscha)*			
UCR spring-run Chinook salmon ESU	Endangered 3/24/1999; 64 FR 14308	9/02/05; 70 FR 52630	ESA section 9 applies
SR spring/summer-run Chinook salmon ESU	Threatened 4/22/1992; 57 FR 14653	10/25/99; 64 FR 57399	6/28/05; 70 FR 37160

Species	Listing Status	Critical Habitat	Protective Regulations
SR fall-run Chinook salmon ESU	Threatened 4/22/1992; 57 FR 14653	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Sockeye salmon (*Oncorhynchus nerka*)			
SR sockeye salmon ESU	Endangered 11/20/1991; 56 FR 58619	12/28/93; 58 FR 68543	ESA section 9 applies
Steelhead (*Oncorhynchus mykiss*)			
UCR steelhead DPS	Threatened 1/05/2006; 71 FR 833	9/02/05; 70 FR 52630	2/1/06; 71 FR 5178
SRB steelhead DPS	Threatened 8/18/1997; 62 FR 43937	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
MCR steelhead DPS	Threatened 3/25/1999; 64 FR 14517	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Upper Columbia River Spring-run Chinook Salmon ESU

The UCR spring-run Chinook salmon ESU was listed as an endangered species on March 24, 1999 (64 FR 14308). On August 16, 2022, in the agency's 5- year review for UCR spring-run Chinook salmon, NMFS concluded that the species should remain listed as endangered (NMFS 2022a).

The ESU includes all naturally spawned spring-run populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam, excluding the Okanogan River subbasin (64 FR 14208). The Okanogan population is considered extinct; however, NOAA designated a "nonessential experimental population" of spring-run Chinook salmon in the Okanogan River subbasin under section 10(j) of the ESA in 2014 (79 FR 20802). The spring-run Chinook salmon that are designated as part of an experimental population are not included as part of the ESU. Seven artificial propagation programs are included in this ESU: The Twisp River Program, Chief Joseph spring Chinook Hatchery Program (Okanogan release), Methow Program, Winthrop National Fish Hatchery Program, Chiwawa River Program, White River Program, and the Nason Creek Program (85 FR 81822). Factors contributing to the decline of UCR spring-run Chinook salmon included the intensive commercial fisheries in the lower Columbia River. These fisheries began in the latter half of the 1800s, continued into the 1900s, and nearly eliminated many salmon and steelhead stocks. With time, the construction of dams and diversions (some without passage) blocked or impeded salmon and steelhead migrations. Early hatcheries, operated to mitigate the impacts of dams on fish passage and spawning and rearing habitat, employed practices such as transferring fish among basins without regard to their origin. While these practices increased the abundance of stocks, they also decreased the diversity and productivity of populations they intended to supplement. Concurrent with these activities, human population growth within the basin was increasing and land uses were adversely affecting salmon spawning and rearing habitat. In addition, non-native species were introduced by both public and private interests that directly or indirectly affected salmon (UCSRB 2007).

Conservation partners have implemented many tributary habitat restoration projects across the ESU, improving habitat conditions for salmon spawning, rearing, and migration in many reaches. However, widespread areas of degraded habitat persist across the basin, with simplified stream channels, disconnected floodplains, impaired instream flow, loss of cold water refugia, and other limiting factors (NMFS 2022a). An emerging risk is climate change and the consequent threat to the juvenile rearing stage vulnerable to low stream flow and high peak flows. Other threats described in the paragraph above as well as pinniped predation continue.

Life history. Adult UCR spring-run Chinook salmon begin returning from the ocean in April and May, with the run into the Columbia River peaking in mid-May. They enter the upper Columbia River tributaries from April through July. After migration, they hold in freshwater tributaries until spawning occurs in the late summer, peaking in mid-to-late August. Juvenile spring Chinook salmon spend a year in freshwater before migrating to saltwater in the spring of their second year of life. Most UCR spring-run Chinook salmon return as adults after 2 or 3 years in the ocean. Some precocious males, or jacks, return after one winter at sea. A few other males mature sexually in freshwater without migrating to the sea. The run, however, is dominated by 4 and 5-year-old fish that have spent 2 and 3 years at sea, respectively. Fecundity ranges from 4,200 to 5,900 eggs, depending on the age and size of the female (UCSRB 2007).

Spatial structure and diversity. There is a single major population group (MPG), the North Cascades MPG, in this ESU. It is composed of three populations including the Wenatchee, Entiat, and Methow. The spatial structure risk is low for the Methow and Wenatchee River populations. It is moderate for the Entiat population due to the loss of production in the lower section, which increases effective distance to other populations (Ford 2022). Large-scale supplementation efforts in the Methow and Wenatchee Rivers are ongoing, intended to counter short-term demographic risks given current survival levels. Supplementation in the Entiat ceased in 2007. All three populations are rated high risk for diversity, driven primarily by the high proportions of hatchery-origin spawners in natural spawning areas and lack of genetic diversity among natural-origin spawners (Ford 2022).

Abundance and productivity. All three populations in the UCR spring-run Chinook salmon ESU remain at high overall risk for the integrated abundance and productivity metric (NMFS 2022a). Productivity remains well below thresholds established in the recovery plan for each population (Ford 2022). Natural-origin abundance has decreased over the levels reported in the 2016 5-year review for all populations in this ESU, in many cases sharply. The abundance data for the entire ESU show a downward trend over the last five years, with the 2015–2019 5-year abundance levels for all three populations declining by an average of 48 percent. Longer-term (15-year) trends are also negative for all populations (Ford 2022). Between 2010 and 2021, there have been substantial year-to-year variations in wild adult escapement at Rock Island Dam ranging from a low of 704 in 2019 to a high of 3,256 in 2015 (Ford 2022). Relatively low ocean survival in recent years was a major factor in recent abundance patterns.

Although the consistent and recent sharp decline of population abundances is concerning, each population remains well above the abundance levels of when they were listed. All three populations remain at high risk.

New information available since the last 5-year review indicates that many restoration and protection actions have been implemented in freshwater tributary habitat, but those actions do not change overall trends in habitat quality, quantity, and function at this time (NMFS 2022a).

We remain concerned with habitat conditions throughout the range of the UCR spring-run Chinook salmon ESU, particularly about water quality, water quantity, riparian condition, and floodplain function.

Recovery. The Interior Columbia Basin Technical Recovery Team (ICTRT) (2005) recommended that three populations meet viability criteria, two of which must meet high viability criteria for the ESU to be viable. The final Upper Columbia Salmon Recovery Board (UCSRB) 2007 recovery plan adopted by NMFS established a recovery goal of securing long-term persistence of viable populations of naturally produced spring Chinook salmon distributed across their native range. The UCSRB identified five recovery criteria that address the VSP metrics of abundance, productivity, spatial structure, and diversity. For recovery, the UCSRB recommended that all spring-run Chinook salmon populations within the ESU meet abundance/productivity criteria that represent a five percent extinction risk over a 100-year period. In addition, the UCSRB recommended that naturally produced spring Chinook salmon utilize four of the five major spawning areas within the Wenatchee subbasin, one major spawning area within the Entiat subbasin, and the major spawning areas within the Methow Subbasin, which include the Twisp, Chewuch, and upper Methow spawning areas.

Many restoration and protection actions have been implemented in freshwater tributary habitat since 2015, but those actions do not change overall trends in habitat quality, quantity, and function. Habitat conditions throughout the range of the UCR spring-run Chinook salmon ESU continue to limit recovery of the species, particularly regarding water quality, water quantity, riparian condition, and floodplain function. The greatest opportunities to advance recovery of the species over the next five years include: (1) prioritizing actions that improve habitat resilience to climate change; (2) reconnecting stream channels with floodplains; (3) implementing restoration actions at watershed scales; and (4) reducing pinniped predation on adults returning to the lower Columbia River (NMFS 2022a).

Crozier et al. (2019) concluded that UCR spring-run Chinook salmon have a high risk of overall climate vulnerability based on their high risk for biological sensitivity, high risk for climate exposure, and moderate capacity to adapt. However, the impact of climate change specifically on marine survival is uncertain. The estuary stage sensitivity is low because of their rapid migration from fresh water to the early marine stage (Crozier et al. 2019). Risk during early life history is low because of the high elevation and relatively stable flows that influence the egg stage in springtime. The juvenile freshwater rearing stage is high risk because of the year-round reliance on freshwater habitat and sensitivity to changes in summer flows and stream temperatures. Upper Columbia River Chinook salmon may have sufficient adaptive capacity to shorten the juvenile freshwater residence period, but the consequences of such a shift for population viability are unknown, and adult spring-run Chinook salmon are also unlikely to shift migration timing substantially.

Summary. Current estimates of natural-origin spawner abundance decreased substantially relative to the levels observed in the prior review for all three extant populations (Ford 2022). Productivities also continued to be very low, and both abundance and productivity remained well below the viable thresholds called for in the Upper Columbia Salmon Recovery Plan (UCSRB 2007) for all three populations. Short-term patterns in those indicators appear to be largely driven by year-to-year fluctuations in survival rates in areas outside of these watersheds—particularly a recent run of poor ocean condition years. Large-scale supplementation efforts in the Methow and Wenatchee Rivers are ongoing, intended to counter demographic risks given current average survival levels and associated year-to-year variability. Based on the combined risk ratings for the VSP parameters, all three of the extant populations of UCR spring-run Chinook salmon remain rated at high overall risk. Under the current recovery plan, implementation of habitat protection and restoration actions directed at key limiting factors is necessary to achieve recovery.

Limiting Factors. Limiting factors for this species are described in the recovery plan (UCSRB 2007).

Snake River Spring/Summer-run Chinook Salmon ESU

Life history. SR spring/summer-run Chinook salmon generally exhibit a stream-type life history, residing in freshwater for a year or more before migrating toward the ocean, although some populations exhibit variations from this pattern (e.g., Salmon River basin juveniles may spend less than 1 year in freshwater) (Copeland and Venditti 2009). Juvenile outmigrants generally pass downstream of Bonneville Dam from late April through early June. Yearling outmigrants are thought to spend relatively little time in the estuary compared to sub-yearling ocean-type fish, often travelling from Bonneville Dam (RM 146) to a sampling site at RM 43 in 1 to 2 days. Adult SR spring-run Chinook salmon return to the Columbia River in early spring and pass Bonneville Dam beginning in early March through late May. Adult SR summer-run Chinook salmon return to the Columbia River from June through July. Adults from both runs hold in deep pools in the mainstem Columbia and Snake Rivers and the lower ends of the spawning tributaries until late summer, when they migrate into the higher elevation spawning reaches (NMFS 2017a).

Spatial structure and diversity. This species includes all naturally spawned populations of spring/summer-run Chinook salmon originating from the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins, and from 15 artificial propagation programs (DOC 2014; USOFR 2020). The ICTRT recognized 28 extant and three extirpated populations of SR spring/summer-run Chinook salmon and aggregated these into five MPGs that correspond to ecological subregions (ICTRT 2003; McClure et al. 2005). Spatial structure ratings remain unchanged from prior status reviews, with low or moderate risk levels for most populations in the ESU. Four populations from three MPGs (Catherine Creek, Grande Ronde River Upper Mainstem, Lemhi River, and Middle Fork Salmon River Lower Mainstem) remain at high risk for spatial structure loss. Three of the four extant MPGs in this ESU have populations that are undergoing active supplementation with local broodstock hatchery programs. In most cases, those programs evolved from mitigation efforts and include some form of sliding-scale management guidelines designed to maximize potential benefits in low-abundance years and reduce potential negative impacts at higher spawning levels. Efforts to evaluate key assumptions and impacts are underway for several programs, but it appears likely that these programs reduce the risk of extinction in the short term.

Abundance and productivity. Most populations in the SR spring/summer-run Chinook salmon ESU remain at high overall risk, with three populations (Minam River, Bear Valley, and Marsh Creek) improving to an overall rating of “maintained” due to an increase in abundance/productivity when measured over a 10- to 20-year period. However, natural-origin abundance has generally decreased over the levels reported in the prior review for most populations in this ESU, in many cases sharply. Relatively low ocean survivals in recent years are likely a major factor in recent abundance patterns. All but three populations in this ESU remain at high risk for abundance and productivity (Ford 2022).

Summary. While there have been improvements in abundance/productivity in several populations relative to the time of listing, most populations experienced sharp declines in abundance in the recent 5-year period, primarily due to variation in ocean survival. If ocean survival rates remain low, the ESU's viability will clearly become much more tenuous. If survivals improve in the near term, however, it is likely the populations could rebound quickly. Overall, we conclude that the Snake River spring/summer-run Chinook salmon ESU continues to be at moderate-to-high risk (Ford 2022).

Limiting factors. Limiting factors for this species are described in the recovery plan (NMFS 2017a).

Snake River Fall-run Chinook Salmon ESU

Life history. Most SR fall Chinook salmon production historically came from large mainstem reaches that supported a subyearling, or "ocean-type," life history strategy. Adults migrated up the Columbia and Snake Rivers from July to August through November and spawned from late September to early October through November. Eggs developed rapidly in the relatively warm lower mainstem reaches of several tributary rivers, which facilitated emergence during late winter and early spring and accelerated growth such that juveniles could become smolts and migrate to the ocean in May and June (NMFS 2017b). This life history strategy allowed fall Chinook salmon to avoid high summer temperatures and losses associated with over-summering and over-wintering that affect other Chinook salmon ESUs with a yearling, or "stream-type," life history strategy.

At present, the subyearling life history strategy contributes most of the natural-origin adult returns to the ESU, and the timing of adult migration and spawning plus egg incubation, fry emergence, and juvenile emigration is similar to historical patterns. However, a yearling life history strategy is also supported, mostly for juveniles from the cooler Clearwater River subbasin, which overwinter in the lower Snake River reservoirs or other cool-water refuge areas and migrate downstream the following spring (NMFS 2017b).

Spatial structure and diversity. This species includes all naturally spawned populations of fall-run Chinook salmon originating from the mainstem Snake River below Hells Canyon Dam; from the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River subbasins; and from four artificial propagation programs (DOC 2014). The ICTRT identified three populations of this species, although only the lower mainstem population exists at present, with spawners in the lower mainstem of the Clearwater, Imnaha, Grande Ronde, Salmon, and Tucannon rivers. The extant population of SR fall-run Chinook salmon is the only remaining population from a historical ESU that also included large mainstem populations upstream of the current location of the Hells Canyon Dam complex (ICTRT 2003; McClure et al. 2005). The extant population has a high proportion of hatchery-origin spawners. The fraction of natural-origin fish on the spawning grounds has remained relatively stable for the last 10 years, with 5-year means of 31 percent (2010–2014) and 33 percent (2015–2019).

Abundance and productivity. SR fall-run Chinook salmon have been above the ICTRT defined minimum abundance threshold since 2001. The geometric mean natural adult abundance for the most recent 10 years (2010–2019) is 9,034, higher than the 10-year geomean reported in the 2015 status review (6,418, 2005–2014). While the population has not been able to maintain the higher returns achieved in 2010 and 2013–2015, it has maintained at or above the ICTRT defined Minimum Abundance Threshold (3,000) during climate challenges in the ocean and rivers. Productivity has been below replacement (1:1) in recent years, and the longer-term 20-year geometric mean raw productivity is 0.63. While below-replacement returns are concerning, the long-term (15-year) abundance trend is stable and the population remains well above the minimum abundance threshold set by the ICTRT (Ford 2022).

Summary. The status of Snake River fall-run Chinook salmon has improved compared to the time of listing. The single extant population in the ESU is currently meeting the criteria for a rating of "viable" developed by the ICTRT, but the ESU as a whole is not meeting the recovery goals described in the recovery plan for the species, which require the single population to be "highly viable with high certainty" and/or will require reintroduction of a viable population above the Hells Canyon Complex (NMFS 2017b). The Snake River fall-run Chinook salmon ESU therefore is at a moderate-to-low risk of extinction, with viability largely unchanged from the prior review (Ford 2022).

Limiting Factors. Limiting factors for this species are described in the recovery plan (NMFS 2017b).

Upper Columbia River Steelhead DPS

The UCR steelhead DPS was listed as endangered on August 18, 1997 (62 FR 43937), and their status was downlisted to threatened on January 5, 2006 (71 FR 834). On August 16, 2022, in the agency's 5-year review for UCR steelhead, NMFS concluded that the species should remain listed as threatened (NMFS 2022a). The UCR steelhead DPS includes all naturally spawned populations of steelhead in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the United States–Canada border (62 FR 43937). Five artificial propagation programs are also considered part of the DPS: the Wenatchee River Program; Wells Complex Hatchery Program (in the Methow River); Winthrop National Fish Hatchery Program; Ringold Hatchery Program; and the Okanogan River Program (85 FR 81822).

Factors contributing to the decline of UCR steelhead included the intensive commercial fisheries in the lower Columbia River that began in the latter half of the 1800s, continued into the 1900s, and nearly eliminated many salmon and steelhead stocks. With time, the construction of dams and diversions, some without passage, blocked or impeded salmon and steelhead migrations. Early hatcheries, operated to mitigate the impacts of dams on fish passage and spawning and rearing habitat, employed practices such as transferring fish among basins without regard to their origin. While these practices increased the abundance of stocks, they also decreased the diversity and productivity of populations they intended to supplement. Concurrent with these activities, human population growth within the basin was increasing and land uses were adversely affecting UCR steelhead spawning and rearing habitat. In addition, non-native species were introduced by both public and private interests that directly or indirectly affected salmon and steelhead (UCSRB 2007).

Conservation partners have implemented many tributary habitat restoration projects across the DPS, improving habitat conditions for steelhead spawning, rearing, and migration in many reaches. However, widespread areas of degraded habitat persist across the basin, with simplified stream channels, disconnected floodplains, impaired instream flow, loss of cold water refugia, and other limiting factors (NMFS 2022a). An emerging risk is climate change and the consequent threat to the juvenile rearing stage vulnerable to low stream flow and high peak flows. Other threats described in the paragraph above as well as pinniped predation continue.

Life history. The life history pattern of steelhead in the UCR DPS is complex. Adults return to the Columbia River in the late summer and early fall. Unlike some species of salmon, most steelhead do not move upstream quickly to tributary spawning streams. A portion of the returning run overwinters in the mainstem Columbia River reservoirs, passing into tributaries to spawn in April and May of the following year. Spawning occurs in the late spring of the year following entry into the Columbia River. Juvenile steelhead generally spend 1 to 3 years rearing in freshwater before migrating to the ocean but have been documented spending as many as 7 years in freshwater before migrating. Most adult steelhead return to the Upper Columbia after 1 or 2 years at sea.

Spatial structure and diversity. This DPS is comprised of a single major population group (MPG)—the North Cascades MPG. The MPG includes four populations of UCR steelhead: the Wenatchee, Entiat, Methow, and Okanogan. Spatial structure is rated at low risk for the Wenatchee and Methow populations, moderate risk for the Entiat population, and high risk for the Okanogan population (Ford 2022). All populations have a high diversity risk rating, largely driven by high levels of hatchery spawners within natural spawning areas and lack of genetic diversity. The integrated spatial structure/diversity risk rating for all populations is characterized as high.

Abundance and productivity. The 2015–2019 5-year geometric mean estimates of natural-origin spawner abundance have declined dramatically (ranging from 28 to 63 percent reductions), erasing gains observed over the past two decades for all four populations (Ford 2022). These recent declines are persistent and large enough to result in small, but negative, 15-year trends in abundance for all four populations. Annual brood-year recruits per spawner estimates have been well below replacement in recent years for all four populations. All populations are consistently exhibiting natural production rates well below replacement, and natural production has also declined consistently, resulting in an increasing fraction of hatchery fish on the spawning grounds each year. For these reasons, the integrated abundance/productivity metric for all populations remains at high risk.

Recovery. The ICTRT (2005) recommended that three populations meet viability criteria, two of which meet high viability criteria for the DPS to be viable; the rationale behind this recommendation is because of the relatively low number of extant populations remaining in the DPS. The final recovery plan (UCSRB 2007) adopted by NMFS established a recovery goal of securing long-term persistence of viable populations of naturally produced steelhead distributed across their native range. The UCSRB identified five recovery criteria that address the VSP metrics of abundance, productivity, spatial structure, and diversity. For recovery, the UCSRB recommended that all steelhead populations within the DPS, except the functionally extirpated Crab Creek population, meet abundance/productivity criteria that represent a 5 percent extinction risk over a 100-year period. In addition, the UCSRB recommended that naturally produced steelhead utilize four of the five major spawning areas in the Wenatchee subbasin, two major spawning areas within the Entiat subbasin, three major spawning areas in the Methow subbasin, and two of the major and minor spawning areas in the Okanogan subbasin. NMFS adopted the UCSRB recommendations as the recovery scenario. To achieve these criteria, significant improvements in all four VSP parameters are needed.

Many restoration and protection actions have been implemented in freshwater tributary habitat since 2015, but those actions do not change overall trends in habitat quality, quantity, and function. Habitat conditions throughout the range of the UCR steelhead DPS continue to limit recovery of the species, particularly with regard to water quality, water quantity, riparian condition, and floodplain function. The greatest opportunities to advance recovery of the species over the next five years include: (1) prioritizing actions that improve habitat resilience to climate change; (2) reconnecting stream channels with floodplains; (3) implementing restoration actions at watershed scales; and (4) reducing pinniped predation on adults returning to the lower Columbia River (NMFS 2022a).

Crozier et al. (2019) concluded that UCR steelhead have a high risk of overall climate vulnerability based on their high risk for biological sensitivity, high risk for climate exposure, and moderate capacity to adapt. Adult UCR steelhead are vulnerable to high stream temperatures during freshwater migration and spawning. However, the impact of climate change specifically on marine survival is uncertain. Risk during early life history is low because of the high elevation and relatively stable flows that influence the egg stage. However, the risk is high for the juvenile freshwater rearing stage because of the year-around reliance on freshwater habitat and sensitivity to changes in summer flows and stream temperatures. Upper Columbia River steelhead may have some latitude to shift timing of adult migrations to avoid peak late summer temperatures (Robards and Quinn 2002), but the consequences of such timing shifts are not known. In each river population, individuals occupying the mid-to-lower reaches are subject to annual high stream temperatures and summer water deficits, and there are limited opportunities to shift juvenile rearing patterns. Anadromous *Oncorhynchus mykiss* may have some opportunities to expand summer rearing and overwintering to habitat areas upstream, but the amount of suitable habitat is limited compared to the potential loss of habitat in downstream reaches.

Summary. Natural-origin abundance has decreased over the levels reported in the prior review for all populations in this DPS, in many cases sharply. The abundance data for the entire DPS show a downward trend over the last five years, with the recent 5-year abundance levels for all four populations declining by an average of 48 percent. Relatively low ocean survival in recent years was a major factor in recent abundance patterns. There are high levels of hatchery spawners within natural spawning areas and a lack of genetic diversity among the populations. Based on the combined risk ratings for the VSP parameters, all four populations in the UCR steelhead DPS remain at a high overall risk. To achieve recovery, it is essential to continue implementing habitat protection and restoration actions directed at key limiting factors.

Limiting factors. Limiting factors for this species are described in the recovery plan (UCSRB 2007).

Snake River Basin Steelhead DPS

Life history. SRB steelhead are generally classified as summer-run. Summer-run steelhead are sexually immature when they return to freshwater, and require several months to mature and spawn. Adult SRB steelhead generally enter the Columbia River from June to August (NMFS 2017a). The peak passage of SRB steelhead has shifted by about two weeks from late July to early August, probably in response to warming temperatures and reduced flows. SRB steelhead can delay their migration up the Columbia and Snake Rivers, and pull into cooler tributaries for temporary holding (NMFS 2017a). Most adults pass Lower Granite Dam by fall, although a small number (approximately 2.0 percent) remain below Lower Granite Dam over the winter and move upstream in the spring (April 3 through June 20). Adults generally hold in larger rivers for several months before moving upstream into smaller tributaries to spawn. Most adults disperse into tributaries from March through May, but potentially into June in higher elevations. Spawning begins shortly after fish reach spawning areas (NMFS 2017a).

Juveniles generally emerge from redds by early June in low elevation streams and by mid-July or later at higher elevations. Juveniles in the SRB typically reside in freshwater for no more than two years, but may stay longer, depending on temperature and growth rate (Fuller et al. 1984; Kucera and Johnson 1986; Chandler and Richardson 2006; NMFS 2017a). Smolts migrate downstream during spring runoff, which occurs from March to mid-June in the Snake River basin, depending on elevation. Juvenile outmigrating steelhead often reach Bonneville Dam by mid-May, and most travel rapidly (less than 5 days) through the estuary and into the ocean (NMFS 2017a). Iteroparity as a life history trait remains in several tributaries of the SRB.

Fisheries managers classify SRB steelhead into two aggregate or morphological groups, A-Index and B-Index, based on length of time spent in the ocean, size at return, and migration timing. Generally, A-Index steelhead are smaller, spend 1 year in the ocean, and begin their upriver freshwater migration earlier in the year than B-Index steelhead. B-Index steelhead are larger, spend 2 years in the ocean, and begin their upriver freshwater migration later in the year. These two groups represent an important component of phenotypic and genetic diversity of the SRB steelhead DPS through the asynchronous timing of ocean residence, segregation of spawning in larger and smaller streams, and possible differences in the habitats of the fish in the ocean (NMFS 2017a). A-Index steelhead occur throughout the steelhead-bearing streams in the Snake River basin and inland Columbia River, while B-Index steelhead only occur in the Clearwater River basin and the lower and middle Salmon River basin. Some populations support both A-Index and B-Index life history expressions.

Spatial structure and diversity. The SRB steelhead DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams in the Snake River Basin of southeastern Washington, northeastern Oregon, and Idaho, as well as several hatchery programs (USOFR 2020). Twenty-five populations (an additional three are extirpated) within five MPGs comprise the SRB steelhead DPS. Inside the geographic range of the DPS, 12 hatchery steelhead programs are currently operational. Five of these artificial programs are included in the DPS.

With one exception, the spatial structure risk ratings for all of the SRB steelhead populations are "low" or "very low risk" given the evidence for distribution of natural production within populations. The exception is Panther Creek, which was given a "high risk" rating for spatial structure based on the lack of spawning in the upper sections (Ford 2022). The diversity risk is low for 10 SRB steelhead populations and moderate for 15 populations. Based on the most recent status review, the integrated spatial structure and diversity risk for SRB steelhead populations are: 10 low, 14, moderate, and 1 high (Panther Creek).

Abundance and productivity. The 5-year geometric mean abundance estimates for the populations in this DPS all showed significant declines from 2014–2019. Each of the populations decreased by roughly 50 percent in the past 5-year period, resulting in a near-zero population change in the past 15 years for the three populations with sufficiently long data time series (Asotin Creek, Joseph Creek, and Grande Ronde River Upper Mainstem). The number of natural-origin spawners in the Upper Grande Ronde Mainstem population appears to be at or above the minimum abundance threshold established by the ICTRT, while the Tucannon River and Asotin Creek populations have remained below their respective thresholds. Hatchery-origin spawner estimates for these populations continue to be low.

Based on the updated viability information, all five MPGs are not meeting the specific objectives in the draft recovery plan, and the viability of many individual populations remains uncertain (Ford 2022). The overall risk rating for SRB steelhead populations are 4 high, 14 maintained, 6 viable, and 1 highly viable. However, a great deal of uncertainty still remains regarding the relative proportion of hatchery fish in natural spawning areas near major hatchery release sites within individual populations. Overall, the SRB steelhead DPS remains at "moderate" risk of extinction, with viability largely unchanged from the 2016 status review (Ford 2022).

Limiting factors. Limiting factors for this species are described in the recovery plan (NMFS 2017a).

Middle Columbia River Steelhead DPS

Life history. The MCR steelhead DPS includes 16 summer-run populations and four winter-run populations. MCR summer steelhead enter the Columbia River between May and October and require several months to mature before spawning in late winter through spring. Winter steelhead enter freshwater between November and April and spawn shortly thereafter. Summer steelhead usually spawn further upstream than winter steelhead. Steelhead in the White Salmon Basin are both summer- and winter-run. Fry emergence typically occurs between May and August dependent on water temperature. Some juveniles move downstream to rear in larger tributaries and mainstem rivers. Most steelhead smolt at 2 years and adults return to the Columbia River after spending 1 to 2 years at sea (NMFS 2009).

Spatial structure and diversity. This species includes all naturally spawned steelhead populations originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream and exclusive of the Wind River in Washington and the Hood River in Oregon, to and including the Yakima River in Washington, excluding steelhead originating from the Snake River Basin. The ICTRT identified 17 extant and three extirpated populations in this DPS (ICTRT 2003; McClure et al. 2005). The populations fall into four MPGs: Cascade eastern slope tributaries, the John Day River, the Walla Walla and Umatilla Rivers, and the Yakima River (ICTRT 2003; McClure et al. 2005). Steelhead in the White Salmon River are part of the White Salmon River population, which is part of the Cascade eastern slopes tributaries MPG.

This DPS includes steelhead from seven artificial propagation programs. The DPS does not currently include steelhead that are designated as part of an experimental population above the Pelton Round Butte Hydroelectric Project in the Deschutes River Basin, Oregon. NMFS has defined the steelhead DPSs to include only the anadromous members of this species (70 FR 67130).

Abundance and productivity. During the most recent review (Ford 2022), NMFS determined that there has been functionally no change in the viability ratings for the component populations, and the MCR steelhead DPS does not currently meet the viability criteria described in the Middle Columbia River Steelhead Recovery Plan (NMFS 2009). While recent (5-year) returns are declining across all populations, the declines are from relatively high returns in the previous 5- to 10-year interval, so the longer-term risk metrics that are meant to buffer against short-period changes in abundance and productivity remain unchanged.

Natural-origin spawning estimates are highly variable relative to minimum abundance thresholds across the populations in the DPS. Two of the four MPGs in this DPS include at least one population rated at “low” or “very low” risk for abundance and productivity, while the other two MPGs remain in the “moderate” to “high” risk range. Spawner abundance estimates for the most recent five years decreased relative to the prior review for all five populations in the Cascades Eastern Slopes Tributary MPG. The White Salmon River population is considered extirpated but is recolonizing since removal of Condit Dam.

Updated information indicates that stray levels into the John Day River populations have decreased in recent years. Out-of-basin hatchery stray proportions, although reduced, remain high in spawning reaches within the Deschutes River basin and the Umatilla, Walla Walla, and Touchet River populations. Overall, the Middle Columbia River steelhead DPS remains at “moderate” risk of extinction, with viability unchanged from the 2016 status review (Ford 2022).

Limiting factors. Limiting factors for this species are described in the recovery plan (NMFS 2009).

2.2.2. Status of Critical Habitat

In this section, we examine the status of designated critical habitat by examining the condition and trends of the essential PBFs of that habitat throughout the designated areas (Table 2). These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration, and foraging). The proposed action affects freshwater rearing and migration habitat.

Table 2. Physical and biological features of critical habitat designated for UCR spring-run Chinook salmon, SR spring/summer Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, UCR steelhead, SRB steelhead, and MCR steelhead, and corresponding species life history events in the Project area.

Physical and Biological Features		Species Life History Event
Type	**Attribute**	
Freshwater Rearing	Forage Natural cover Water quality	Parr and smolt growth and development
Freshwater Migration	Free of artificial obstruction Natural cover Water quality Water quantity	• Adult upstream migration and holding • Parr and smolt growth, development, and seaward migration

For salmon and steelhead, NMFS' critical habitat analytical review teams (CHART) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005a). The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, the CHART evaluated the quantity and quality of habitat features (e.g., spawning gravels, wood and water condition, and side channels), the relationship of the area compared to other areas within the species' range, and the significance of the population occupying that area to the species' viability criteria. Thus, even if a location had poor habitat quality, it could be ranked with a high conservation value, if it were essential due to factors such as limited availability (e.g., one of a very few spawning areas), a unique contribution of the population it served (e.g., a population at the extreme end of geographic distribution), or the fact that it serves another important role (e.g., obligate area for migration to upstream spawning areas).

Critical habitat has been designated in the Interior Columbia Recovery Domain (ICRD) for UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, UCR steelhead, SRB steelhead, and MCR steelhead. The complex life cycle of salmon and steelhead give rise to complex habitat needs, particularly in freshwater. The gravel used for spawning must be a certain size and largely free of fine sediments to allow successful incubation of the eggs and later emergence or escape from the gravel as alevins. Eggs also require cool, clean, and well-oxygenated waters for proper development. Juveniles need abundant food sources, including insects, crustaceans, and other small fish. They need instream places to hide from predators (mostly birds and larger fish), such as under logs, root wads, and boulders, as well as beneath overhanging vegetation. They also need refuge from periodic high flows in side channels and off-channel areas, and from warm summer water temperatures in cold-water springs and deep pools. Returning adults generally do not feed in freshwater, but instead rely on limited energy stores to migrate, mature, and spawn. Like juveniles, the returning adults also require cool water that is free of contaminants, and migratory corridors with adequate passage conditions (timing, water quality/quantity) to allow access to the various habitats required to complete their life cycle (NMFS 2005b).

Habitat quality in tributary streams in the ICRD varies from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994; NMFS 2009). Intense 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 (McIver and Starr 2001; NMFS 2009) have degraded critical habitat throughout much of the ICRD. Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems for critical habitat in developed areas.

Construction of large hydropower and water storage projects associated with the Columbia River System and its tributaries further affected salmonid migratory conditions and survival rates. Production of salmon and steelhead in the ICRD was especially impacted (e.g., lower migration speeds, increased predation rates from piscivorous birds and fishes, increased water temperature, and dam passage mortality) by the development of major dams and reservoirs in the mainstem Columbia and Snake Rivers.

Many stream reaches designated as critical habitat in the ICRD are over-allocated, with more allocated water rights than existing stream flow. 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 stream flow has been identified as a limiting factor for UCR steelhead (UCSRB 2007).

Many stream reaches designated as critical habitat are listed on Washington and Oregon's Clean Water Act Section 303(d) lists for water temperature. Many areas that were historically suitable for rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures.

Despite these degraded habitat conditions, the hydrologic unit codes that have been identified as critical habitat for these species are largely ranked as having high conservation value. Conservation value reflects several factors, including: (1) how important the area is for various life history stages; (2) how necessary the area is to access other vital areas of habitat; and (3) the relative importance of the populations the area supports relative to the overall viability of the ESUs or DPSs.

A summary of the status of critical habitats considered in this opinion is provided in Table 3.

Table 3. Critical habitat, designation date, Federal Register (FR) citation, and status summary for critical habitat for the seven salmon and steelhead species considered in this opinion (NMFS 2005a and b)

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Upper Columbia River spring-run Chinook salmon	9/02/05 70 FR 52630	Critical habitat encompasses four subbasins in Washington containing 15 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PBFs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005a&b). However, most of these watersheds have some, or high, potential for improvement. We rated the conservation value of HUC5 watersheds as high for 10 watersheds, and medium for five watersheds. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Columbia River Systems.
Snake River spring/summer-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers (except the Clearwater River) presently or historically accessible to this ESU (except reaches above impassable natural falls and Hells Canyon Dam). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Columbia River Systems.
Snake River fall-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers presently or historically accessible to this ESU (except reaches above impassable natural falls, and Dworshak and Hells Canyon dams). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Columbia River Systems.
Snake River sockeye salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers; Alturas Lake Creek; Valley Creek; and Stanley, Redfish, Yellow Belly, Pettit and Alturas lakes (including their inlet and outlet creeks). Water quality in all five lakes generally is adequate for juvenile sockeye salmon, although zooplankton numbers vary considerably (NMFS 2005a&b). Some reaches of the Salmon River and tributaries exhibit temporary elevated water temperatures and sediment

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
		loads that could restrict sockeye salmon production and survival. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Columbia River Systems.
Upper Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 10 subbasins in Washington containing 31 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PBFs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005a&b). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 20 watersheds, medium for 8 watersheds, and low for 3 watersheds. The Columbia River corridor is considered to have high conservation value.
Snake River Basin steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 25 subbasins in Oregon, Washington, and Idaho. These subbasins contain 271 occupied and 20 unoccupied watersheds. Habitat quality in tributary streams varies from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Columbia River Systems. We rated conservation value of HUC5 watersheds as high for 220 watersheds, medium for 44 watersheds, and low for 27 watersheds. The Lower Snake/Columbia River corridor is considered to have high conservation value (NMFS 2005a&b).
Middle Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 15 subbasins in Oregon and Washington containing 111 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PBFs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005a&b). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of occupied HUC5 watersheds as high for 78 watersheds, medium for 24 watersheds, and low for 9 watersheds. The Columbia River corridor is considered to have high conservation value.

2.2.3. Climate Change

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 (ISAB 2007; Philip et al. 2021), resulting in increased droughts and wildfires, and variation in river flow patterns. 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 and b; 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 (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 and b, EPA 2021). Consider the example of the adult sockeye salmon, both Upper Columbia and Snake River stocks, in 2015, when high summer water temperatures contributed to extremely high losses 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) and fair in 2023[1]. 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 in 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).

[1] https://www.fisheries.noaa.gov/west-coast/science-data/ocean-conditions-indicators-trends

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 support climate resilience (Jorgensen et al. 2021) in freshwater spawning, rearing, and migratory habitats, promote 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). For this consultation, the action area is the zone contained within the northern and southern ends (upstream and downstream ends, respectively) of Badger Island and east to the left bank (looking downstream) of the Columbia River (Figure 1). Badger Island is located on the Columbia River roughly 25.5 miles upstream of McNary Dam.

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 action area is located within Lake Wallula (McNary Dam Reservoir) and serves primarily as a migration corridor for all seven adult and juvenile salmon and steelhead species considered in this opinion. Some juvenile steelhead and subyearling Chinook salmon may spend a short time in the area for rearing. The river substrate consists of sand and silt and provides habitat for some invertebrate prey species for salmon and steelhead.

Habitat in the Columbia River has been substantially altered by basin-wide water management operations, the construction and operation of hydroelectric projects, the growth of native avian and pinniped predator populations, the introduction of non-native species (e.g., smallmouth bass, walleye, channel catfish, and invertebrates), and other human practices that have degraded water quality and habitat. Compared to historic operations of the Columbia River System, the river is now managed to approximate the shape of the natural hydrograph more closely to enhance flows and water quality and to improve juvenile and adult fish survival. Nevertheless, since the development of the hydrosystem, average monthly flows at Bonneville Dam have been lower during May to July and higher in October to March, even though several million acre-feet of stored water is released each summer to augment flows (NMFS 2020b).

Reduced spring and summer flows have increased travel times during outmigration for juvenile salmon and steelhead, resulting in an increase of exposure time to piscivorous fish and birds in the Columbia River (Harnish et al. 2014), including Lake Wallula. Furthermore, the large surface areas of Lake Wallula and other Columbia River reservoirs result in slower river velocities which contribute to warmer late summer/fall water temperatures.

The action area lies within an arid portion of eastern Washington with the nearby town of Wallula averaging roughly 8.7 inches of precipitation a year. The summer months are warm and dry and most of the precipitation falls in the winter and spring months. Few mature trees are present within the action area with most of the vegetation consisting of sage brush, bitter brush, and native grasses. Badger Island forms the western boundary of the action area and is undeveloped, composed primarily of native shrubs and grasses with small stands of black cottonwood trees (DEA 2023).

The river substrate in the action area consists of sand and silt and provides habitat for several invertebrate prey species for salmon and steelhead. The Columbia River in the action area is included on the Clean Water Act section 303(d) list of impaired waters for temperature and some toxicants (e.g., 4,4'-DDE and PCBs).[2]

While the existing pump station has been in operation for decades, the existing water intake facility was first fitted with fish screens in 1978 and refitted with screens that met NMFS fish screening criteria in 2014. Water withdrawal operations occur during the typical irrigation season of April through the end of September. Significant sediment deposition around the existing intake screens has required annual maintenance dredging since 2021 and is permitted by the Corps to continue through 2026. We issued a Letter of Concurrence for this maintenance dredging on July 21, 2020 (WCRO-2020-01887).

[2] Assessment of state waters 303d - Washington State Department of Ecology

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 but that are not part of the action. 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 402.02). Effects to ESA-listed salmon and steelhead and critical habitat include: (1) disturbance and displacement from increased sound levels during steel pile and steel sheet pile installation; (2) potential injury and death from fish salvage operations; (3) temporary water quality impacts from elevated total suspended solids and increases in turbidity; (4) increased risks to water quality from accidental toxic spills; (5) temporary and permanent loss of aquatic habitat, and (6) behavior modification from other in-water construction activities.

2.5.1. Effects on Species

Presence and Exposure

Project construction is expected to take two years to complete with in-water work occurring during a winter in-water work window of December 1 through February 28 of both years. Adults and juveniles of all seven of the salmon and steelhead species considered in this opinion migrate through the action area and will be exposed to operation and maintenance of the replacement pump station and pipes. However, as described below, NMFS expects that very few salmon and steelhead will be present in the action area during the in-water work window and be exposed to construction effects.

Adult salmon and steelhead in the action area. A small number of adult UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, and SR fall-run Chinook salmon may be present in the action area during the in-water work period. The running 10-year average (2013–2022) passage counts at McNary Dam show that an average of about 99.98 percent of all adult Chinook salmon pass the action area outside of the in-water work window. Some adult Chinook pass McNary Dam from December through February (CBR 2024). Additionally, the same 10-year average passage counts at McNary Dam show that some adult UCR, SRB, and MCR steelhead are likely to be in the action area during the in-water work period, but on average 99.6 percent of adult steelhead migrate through the action area outside of the in-water work period. Some adult steelhead overwinter in the Columbia River and could be in the action area while in-water work is occurring. Lastly, based on this same data, we do not expect that any adult sockeye salmon will be present in the action area while in-water work is occurring (CBR 2024).

Table 4. Ten-year average (2013–2022) passage counts at McNary Dam for adult Chinook salmon and steelhead (CBR 2024).

Month	Chinook Salmon	Steelhead
January	4	156
February	0	49
March	19	1,307

Month	Chinook Salmon	Steelhead
April	8,491	442
May	53,479	74
June	42,654	782
July	29,743	8,520
August	18,902	10,314
September	186,909	57,021
October	46,758	28,150
November	2,522	2,039
December	91	189

In conclusion, based on the best available data, we expect only a very few individual adult UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, and UCR, SRB, and MCR steelhead to be in the action area during the in-water work period and exposed to construction effects.

Juvenile salmon and steelhead in the action area. Nearly all the out-migrating juvenile salmon and steelhead considered in this opinion will pass through the action area outside the in-water work window. Outmigrating juveniles pass through the area from late March through early September and most (95 percent) pass between mid-April and mid-July. However, due to their life histories, we expect only a very few individual juvenile SR fall-run Chinook salmon and UCR, SRB, and MCR steelhead to overwinter in the action area during the winter in-water work window and be exposed to construction effects.

Sound Pressure and Noise Effects

Piles that are driven into riverbed substrate propagate sound through the water, which can cause rapid changes in pressure, rupturing or hemorrhaging tissue in a fish's swim bladder (Popper et al. 2006). 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 (CalTrans 2020; Hastings and Popper 2005). Barotrauma injuries can include external and internal damage including bulging eyes, ruptured organs and swim bladders, hemorrhaging, and death (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 significantly reduced. For this project, only vibratory drivers will be employed; no impact drivers will be used.

Vibratory pile and sheet pile driving and removal. NMFS uses 150 decibels (dB) as a threshold for examining the potential for behavioral or physical injury responses by salmon and steelhead. NMFS considers vibratory pile driving to create noise that is less than the 150 dB threshold, thus resulting in only potential behavioral effects such as startle responses or complete avoidance of the relatively small immediate work area. We do not expect any physical injury to occur to any species included in this opinion from vibratory driving or removal of either the 12-inch steel piles or the 24-inch steel sheet piles.

We anticipate that any behavioral responses from vibratory pile driving or removal to the very few individual adult or juvenile salmon and steelhead that are present in the action area will be minor and range from no response, moving a short distance away from the work area, or avoiding the immediate work area. If disturbed, adult salmon and steelhead are large enough and can easily move to other available areas of preferred overwinter habitat in the McNary Reservoir. Therefore, we expect only minor, temporary behavior modifications to adults from pile driving; this response will not affect spawning success. Juveniles that exhibit avoidance behaviors and move away from affected areas may be exposed to an increased risk of predation; however, we believe this is improbable. The timing of the in-water work will occur when piscivorous fish (e.g., northern pikeminnow) are not very active and juveniles will be able to move into similar suitable habitat nearby. In addition, we do not expect this response to affect juvenile growth.

Nearshore Work Area Isolation and Fish Salvage Effects

As described in section 1.3.1.1 above, and in Section 2.2 of the BA, a cofferdam consisting of sheet pile and possibly clean rock will be placed to isolate the area for dredging and installation of the pipes that will connect to the on-land pumps. The cofferdam will extend about 125 feet into the Columbia River. Fish will be salvaged according to the procedures and guidelines described in NMFS (2020a) and returned to the river away from the work area. This work will be completed during the in-water work window between December 1 and February 28, outside of the major migration periods for both adults and juveniles.

Juvenile fish contained within the cofferdam may be difficult to capture and could sustain injuries and experience high stress during and after capture. Injuries can occur resulting in harm or death to some individuals. Similarly, if a juvenile fish remains trapped in an isolated work area during construction, injury that results in mortality is likely. However, we expect that only a very few, if any, juvenile salmon and steelhead would be trapped within the cofferdam and subject injury or mortality from capture and handling. Due to their size and mobility, we expect any adults that are in the immediate work area to move away from the area and not be subject to capture or handling. Therefore, we expect only minor, temporary behavior modifications to adults from work area isolation and fish salvage activities, which will not affect spawning success.

Water Quality Effects

Sedimentation and turbidity. Activities associated with temporary steel pile and sheet pile installation and removal, rock placement and removal, dredging, installation of irrigation pipe and fish screens and removal of the existing irrigation structures, will temporarily disturb soil and riverbed sediments, potentially resulting in brief increases in turbidity and suspended sediments in the action area. Turbidity plumes are expected to affect a very small portion of the channel width and extend no more than 300 feet downstream of the disturbed site. Construction-related increases in sedimentation and turbidity above the background level could potentially affect fish species and their habitat by displacement of fish from preferred habitats, reducing juvenile survival, interfering with feeding activities, and reducing primary and secondary productivity. The magnitude of potential effects on fish depends on the timing and extent of sediment loading and flow in the river before, during, and immediately following construction.

For those fish that cannot avoid turbid conditions, effects of suspended sediment (either as turbidity or suspended solids) are well documented (Bash et al. 2001; Lloyd et al. 1987; Sigler et al. 1984). High concentrations of suspended sediment can have both direct and indirect effects on salmonids. The severity of these effects depends on the sediment concentration, duration of exposure, and sensitivity of the affected life stage. Temporary increases in suspended sediment concentrations have highly variable effects on fish, ranging from behavioral effects including alarm reactions and avoidance responses to sublethal effects including reduced feeding and physiological stress (Newcombe and Jensen 1996). Juvenile salmonids often avoid streams that are chronically turbid (Lloyd 1987) or move laterally or downstream to avoid turbidity plumes (Sigler et al. 1984). Several studies have documented active avoidance of turbid areas by juvenile and adult salmonids (Lloyd et al. 1987; Servizi and Martens 1992; Sigler et al. 1984). The severity of effect of suspended sediment increases as a function of the sediment concentration and exposure time, or dose (Bash et al. 2001; Newcombe and Jensen 1996). Sigler et al. (1984) found that prolonged exposure to turbidities between 25 and 50 nephelometric turbidity units (NTU) resulted in reduced growth and increased emigration rates of juvenile coho salmon and steelhead compared to controls. These findings are generally attributed to reductions in the ability of salmon to see and capture prey in turbid water. Chronic exposure to high turbidity and suspended sediment may also affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress. Berg and Northcote (1985) observed changes in social and foraging behavior and increased gill flaring (an indicator of stress) in juvenile coho salmon at moderate turbidity (30–60 NTU). In this study, behavior returned to normal quickly after turbidity was reduced to lower levels (0–20 NTU).

Turbidity and suspended sediments resulting from construction activities will occur during the winter in-water work window when there will be very few, if any, salmon and steelhead present in the action area. Furthermore, construction BMPs (e.g., silt fencing and upland deposit of dredged material) will help to minimize turbidity and suspension of riverbed materials, thus significantly reducing potential effects to any salmon and steelhead present in the action area. NMFS expects any fish present in the area will be able to avoid the spatially limited turbidity, and that most individual fish that encounter temporary elevated turbidity or sediment concentrations will display avoidance behaviors and move away from affected areas into similar suitable surrounding habitat. Due to their size and mobility, we expect adults will move away from the area of increased turbidity. Therefore, we expect only minor, temporary behavior modifications to adults from increased turbidity; this response is not expected to affect spawning success. Juveniles that exhibit avoidance behaviors and move away from affected areas may be exposed to an increased risk of predation; however, we believe this is improbable. The timing of the in-water work will occur when piscivorous fish (e.g., northern pikeminnow) are not very active and juveniles will be able to move into similar suitable habitat nearby. In addition, we do not expect this response to affect juvenile growth.

Chemical contamination. Additional impairment of water quality may result from accidental releases of fuel, oil, and other contaminants that can injure or kill aquatic organisms. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAHs), which can kill salmon at high levels of exposure, and can cause sublethal, adverse effects at lower concentrations (Meador et al. 2006). Therefore, spills that make their way into the Columbia River could harm fish. The operation of equipment and heavy machinery will occur from the left bank and temporary floating barges. NMFS anticipates that only very small quantities (ounces) of PAHs are likely to enter the stream with each accidental release or spill. The BMPs include the SPCC Plan which directs the use of spill prevention and containment equipment which will be on site. Construction equipment will be inspected daily for hazardous material leaks and equipment will be staged at a minimum of 150 feet from the river's edge. These will minimize the risk of a spill and the opportunity for contaminants to enter the waterway and affect salmon and steelhead. If a spill does occur, we expect containment will occur quickly with emergency spill kits located on site, and conservation measures will minimize its dispersal, limiting exposure and related impacts of adult and juvenile salmon and steelhead. Therefore, NMFS does not expect any fish to be injured or killed by exposure to accidental releases of very small amounts of fuel, oil, and other contaminants caused by this action.

Aquatic Habitat Effects

An area of approximately 88,527 total square feet (2.03 acres) of aquatic habitat will be impacted by dredging, resulting in a temporary loss of benthic habitat, and a permanent loss of 39,937 square feet (0.92 acres) due to permanent placement of the new structures. Adult salmon and steelhead will not be affected by the temporary or permanent loss of aquatic habitat because they can readily move to other preferred habitats in the McNary Reservoir with no effect to spawning success. Effects to juvenile salmon and steelhead from the temporary loss of habitat due to dredging will be minor. The area dredged is only a small fraction of the available benthic habitat in the Columbia River at this location, the proposed action will not affect continual invertebrate drift, and impacts to benthic habitat will recover as the river returns sediment and invertebrate prey species recolonize. The permanent loss of habitat due to new structures being partially buried or placed on top of the sediment will not allow recovery of benthic habitat and will reduce prey availability to juvenile salmon and steelhead in the future. However, this area is only a small fraction of the available benthic habitat in the Columbia River at this location. Therefore, we expect that the minor permanent benthic habitat impacts will not result in a measurable effect to juveniles of any species covered in this opinion.

Temporary Behavior Modification from Other In-water Activities

All additional in-water construction activities (i.e., rock placement and removal, dredging, barge operations, fish screen installation, and removal of the existing irrigation structures) will create additional sound that could temporarily modify fish behavior. Very few individual adults considered in this opinion may be present in the action area during in-water work and may alter normal overwintering behavior due to in-water construction noise. These individuals, if disturbed, are large enough and can easily move to other areas of preferred overwinter habitat in the McNary Reservoir. Therefore, we expect only minor, temporary behavior modifications to adults from additional in-water activities, which will not affect spawning success.

Most juvenile salmon and steelhead considered in this opinion will have migrated through the action area long before the in-water work window period. However, NMFS anticipates that some juvenile SR fall-run Chinook salmon and juvenile UCR, SRB, and MCR steelhead may be rearing in the action area during the winter period. The effect of noise from in-water construction activities could include modification of normal juvenile feeding and rearing behavior from equipment working in the water. Juveniles that exhibit avoidance behaviors and move away from affected areas may be exposed to an increased risk of predation; however, we believe this is improbable. The timing of the in-water work will occur when piscivorous fish (e.g., northern pikeminnow) are not very active and juveniles will be able to move into similar suitable habitat nearby. In addition, we do not expect this response to affect juvenile growth.

2.5.2. Effects on Critical Habitat

Critical habitat for UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, and UCR, SRB, and MCR steelhead is designated in the action area. The action area includes water quality, rearing and forage, and passage attributes for the freshwater migration and rearing PBFs of designated critical habitat. NMFS expects effects to these attributes and PBFs of critical habitat from the installation and removal of floating silt curtains; installation and removal of steel piles and steel sheet piles; installation and removal of rock; and dredging.

Water Quality

Water quality will be temporarily reduced within the project area during two in-water work periods (December 1–February 28). The proposed action is expected to increase delivery of suspended sediment intermittently and temporarily to the waterway during installation and removal of piles, sheet pile, rock, irrigation pipe, fish screens, and silt curtains or other silt containment equipment.

Because erosion control measures and BMPs will be implemented during construction, suspended sediment and turbidity plumes are expected to be relatively small or short lived. The temporary pulses (minutes to a few hours) of increased turbidity and suspended sediment are not expected to move more than 300 feet from the work area. Minor leaks and spills of petroleum-based fluids may occur, but BMPs and the SPCC direct that spill prevention and containment be on site and immediately available should any unexpected spills occur. Therefore, overall, NMFS expects small, temporary, and intermittent, negative effects to water quality during two in-water construction periods.

Rearing and Forage

Dredging will result in a temporary loss of approximately 48,580 square feet (1.12 acres) and a permanent loss of 39,937 square feet (0.92 acres) of rearing and forage habitat. The permanent loss will be the result of the irrigation structure being partially buried and placed on top of the river bottom. The natural movement of sediment in the river will eventually restore sediment and benthic habitat for invertebrate species in the 1.12 acres of temporary loss within the dredging footprint. Therefore, NMFS expects only a small, permanent negative effect to rearing and forage habitat.

Unobstructed Passage

Work area isolation and fish salvage may affect quality of juvenile salmonid migration.

Proposed Project Mitigation

To mitigate the permanent loss of forage habitat due to dredging and installation of new irrigation structures, the Legrow water supply relocation project will partially fund stream restoration work sponsored by the Walla Walla County Conservation District. The project proposes to restore 1.3 miles of Coppei Creek, a tributary of the Touchet River within the Walla Walla River basin. The restoration will address limiting factors including simplified instream conditions, channel stability, temperature, lack of deep pools, lack of key habitat, and fine sediment input from farming and other land use activities (DEA 2023).

The primary habitat to be restored is designated as a major spawning area and is designated critical habitat for MCR steelhead. Restoration work includes large woody debris and logjam placement, levee removals, floodplain reconnection, side-channel creation, and riparian plantings. In total, the Coppei Creek restoration project will directly affect approximately 4.7 acres of stream and riparian habitat. Of this, approximately one acre will be funded by the water supply project to offset the permanent loss of in-water substrate and associated benthic functions (DEA 2023).

The proposed restoration project does not replace the existing forage habitat, in real space or time, that will be permanently lost in the Columbia River due to the proposed action, and this loss is not evaluated in this opinion. However, we acknowledge that proposed restoration work in Coppei Creek may have significant value for MCR steelhead and its critical habitat. The restoration work will occur in the Walla Walla River basin. The Walla Walla River enters the Columbia River just 3.4 miles downstream of the action area. We note that the permanent loss of forage habitat due to this restoration project will also reduce forage opportunities for the other six juvenile salmon and steelhead species that migrate through or rear in the action area and will not benefit from the proposed restoration project.

2.6. Cumulative Effects

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

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

The BA noted that a non-federally funded project is expected to occur near the action area at the Port of Walla Walla in Burbank, Washington, at the confluence of the Snake and Columbia rivers. This project proposes to construct improvements to the Burbank Business Park. The project will reconstruct and repave sidewalks, parking areas, curbs, and gutters, and install stormwater structures (DEA 2023). NMFS, however, is not aware of other 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. Thus, although NMFS finds it likely that the cumulative effects of these activities will have adverse effects commensurate to those of similar past activities, it is not possible to quantify these effects. Some of these future activities will require a Federal permit, and thus will undergo ESA consultation. Many future State or tribal actions would likely have some form of Federal funding or authorization and therefore would be reviewed by NMFS.

Based on the analysis above, the cumulative effects of future State and private activities will have a continued negative effect on ESA-listed fish and their critical habitats.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in 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 biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

2.7.1. Species

All seven species of ESA-listed salmon and steelhead considered in this opinion predominantly use the action area as a migration corridor. Very few individual adults and juveniles of the species considered in this opinion could be present in the action area during the in-water work window of December 1 through February 28. Fish present during the in-water work window may be affected by noise due to pile driving and removal, fish salvage operations, turbidity plumes, toxic contaminants, loss of aquatic habitat, entrapment by fish screen (juveniles only), and behavioral modifications due to other in-water activities.

All piles will be installed with a vibratory hammer. NMFS considers vibratory pile driving to create noise that is less than the 150 dB threshold, thus resulting in potential behavioral effects such as startle responses or complete avoidance of the immediate work area. We do not expect any physical injury to occur to any species included in this opinion from vibratory driving. We anticipate that any behavioral responses from the very few individual adult or juvenile salmon and steelhead that are present in the action area during the in-water work window will be minor, temporary, and result is no response, moving a short distance away from the work area, or avoiding the immediate work area. Adult salmon and steelhead, if present, can readily move to other preferred habitats in the McNary Reservoir with no effect to spawning success. Juveniles that exhibit avoidance behaviors and move away from affected areas may be exposed to an increased risk predation; however, we believe this is improbable. The timing of the in-water work will occur when piscivorous fish (e.g., pike minnow) are not feeding and juveniles will be able to move into similar suitable habitat nearby. In addition, we do not expect this response to affect juvenile growth.

In-water construction noise is likely to frighten most juveniles and all adults away from the immediate work area during area isolation actives. Due to their size and mobility, and the availability of similar habitat in the McNary Reservoir, we expect any adults that are in the immediate work area to move away from the isolation area and not be subject to capture or handling. Therefore, we expect only minor, temporary behavior modifications to adults from work area isolation and fish salvage activities; this response is not expected to affect spawning success. A very few number of juvenile salmon and steelhead that have not fully out migrated and overwintered in the action area may potentially be trapped inside the nearshore cofferdam. We expect that only a very few individual juveniles, if any, will be adversely affected by area isolation and fish salvage activities.

Pulses of suspended sediment and turbidity will result from dredging, pile placement and removal, rock placement and removal, and removal of the existing irrigation structures. Due to their size and mobility, and the availability of similar habitat in the McNary Reservoir, we expect adults will move away from the area of increased turbidity. Therefore, we expect only minor, temporary behavior modifications to adults from increased turbidity; this response is not expected to affect spawning success. Juveniles that exhibit avoidance behaviors and move away from affected areas may be exposed to an increased risk of predation; however, we believe this is improbable. The timing of the in-water work will occur when piscivorous fish (e.g., northern pikeminnow) are not very active and juveniles will be able to move into similar suitable habitat nearby. In addition, we do not expect this response to affect juvenile growth.

NMFS anticipates that only very small quantities (ounces) of PAHs are likely to enter the stream with each accidental release or spill. The BMPs include the SPCC Plan which directs the use of spill prevention and containment equipment, which will be on site. Construction equipment will be inspected daily for hazardous material leaks and equipment will be staged at a minimum of 150 feet from the river's edge. These will minimize the risk of a spill and the opportunity for contaminants to enter the waterway and affect salmon and steelhead. If a spill does occur, we expect containment will occur quickly with emergency spill kits located on site, and conservation measures will minimize its dispersal, limiting exposure and related impacts of adult and juvenile salmon and steelhead. Therefore, NMFS does not expect any fish to be injured or killed by exposure to very small amounts of accidental releases of fuel, oil, and other contaminants caused by this action.

An area of approximately 88,527 total square feet (2.03 acres) of aquatic habitat will be impacted by dredging, resulting in a temporary loss of benthic habitat. A permanent loss of 39,937 square feet (0.92 acres) is expected from the placement of permanent structures. We believe the loss of aquatic habitat will not affect any adult salmon or steelhead covered in this opinion. We expect that temporary and permanent benthic habitat impacts will not result in a measurable effect to juveniles of any species covered in this opinion.

NMFS expects that the effect of additional noise during in-water construction activities (i.e., rock placement and removal, dredging, barge operations, fish screen installation, and removal of the existing irrigation structures) to adults and juveniles present during the in-water work window will be temporary and minor; these responses will not affect growth of juveniles or spawning success of adults. Juveniles that exhibit avoidance behaviors and move away from affected areas will be able to move into similar suitable surrounding habitat and, as discussed above, not increase their risk of predation. Due to their size and mobility, and the availability of similar habitat in the McNary Reservoir, we expect any adults that are in the immediate work area to move away.

Of the species considered in this opinion, three remain at high risk of extinction and three remain at moderate or moderate to low risk of extinction. The three "high risk" species are UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, and UCR steelhead. The SRB and MCR steelhead have a "moderate risk" of extinction and SR fall-run Chinook salmon are at a "moderate to low" risk of extinction. NMFS identified many factors as limiting the recovery of these species, most notably degraded habitat (especially floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, stream substrate and streamflow), hatchery and harvest-related effects, and adverse effects related to hydropower development.

Potential adverse effects of the proposed action arise only from fish salvage and work isolation activities, may occur to only very few individual juveniles from all species included in this opinion, and are not expected to appreciably alter the abundance, productivity, spatial structure, or diversity of UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR steelhead, SRB steelhead, and MCR steelhead. It is NMFS' opinion that when the effects of the action and cumulative effects are added to the environmental baseline, and in light of the status of each species, the effects of the action will not cause reductions in reproduction, numbers, or distribution that would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of these species.

2.7.2. Critical Habitat

Critical habitat in the action area is degraded due to transportation infrastructure, the Columbia River System dams and reservoirs, marinas, docks, and riprap. Dams and reservoirs within the migratory corridor have altered the river environment and affected fish passage. Water impoundment, dam operations, and upstream land use activities affect downstream water quality characteristics. Salmon and steelhead are exposed to high rates of natural predation during all life stages from fish, birds, and marine mammals, exacerbated in some locations (by providing perch sites or hiding spots for predators) by development. Shoreline development has reduced the quality of nearshore salmon and steelhead habitat by eliminating native riparian vegetation, displacing shallow water habitat with fill materials. In addition, the cumulative effects of State and private actions within the action area are anticipated to continue to have negative effects on ESA-listed salmonids.

As noted in Section 2.2.3, climate change is likely to further impact designated critical habitat. Increases in water temperature and changes to the hydrological regime will reduce suitable salmon habitat and cause earlier migration of smolts. Warmer temperatures will likely lead to increased predation on juvenile salmonids in mainstem reservoirs (ISAB 2007). This is particularly true of non-native species such as bass and channel catfish where climate change will likely further accelerate their expansion (ISAB 2007). In addition, the warmer water temperatures will increase consumption rates by predators due to increased metabolic rates, which influence food demand.

The potential effects of the proposed action on critical habitat are described in Section 2.5.2. Critical habitat is present for seven salmon and steelhead ESUs and DPSs considered in this opinion. NMFS expects adverse effects to the water quality, rearing and foraging, and passage attributes of the freshwater rearing and migration PBFs of designated critical habitat for six ESUs and DPSs covered in this opinion from installation and removal of floating silt curtains; installation and removal of steel piles and steel sheet piles; installation and removal of rock; and dredging.

The proposed action will have small, temporary, and intermittent negative effects to water quality (turbidity, sediment, chemical contaminations) for intermittent periods during two, in-water work seasons. Increases in total suspended solids and turbidity during project construction are expected to occur intermittently, be small, extend no more than 300 feet from the immediate work area, and persist for minutes to a few hours. Minor leaks and spills of petroleum-based fluids (not more than ounces) will be contained with emergency spill kits and construction staging and fueling will be located not less than 150 feet from the river’s edge.

Dredging will result in a temporary loss of approximately 48,580 square feet (1.12 acres) and a permanent loss of 39,937 square feet (0.92 acres) of rearing and forage habitat. The permanent loss will be the result of the irrigation structure being partially buried and placed on top of the river bottom. The natural movement of sediment in the river will eventually restore sediment and benthic habitat for invertebrate species that juvenile salmon and steelhead prey on.

As mitigation for the permanent loss of juvenile forage habitat, the Legrow water supply relocation project will partially fund stream restoration work sponsored by the Walla Walla County Conservation District. The project proposes to restore 1.3 miles of Coppei Creek, a tributary of the Touchet River within the Walla Walla River basin and designated critical habitat for MCR steelhead. The restoration will address limiting factors including simplified instream conditions, channel stability, temperature, lack of deep pools, lack of key habitat, and fine sediment input from farming and other land use activities (DEA 2023). In total, the Coppei Creek restoration project will directly affect approximately 4.7 acres of stream and riparian habitat. Of this, approximately 1 acre will be funded by the water supply project to offset the permanent loss of in-water substrate and associated benthic functions (DEA 2023). The proposed restoration project does not replace the existing forage habitat, in real space or time, that will be permanently lost in the Columbia River due to the proposed action. As noted in NMFS (2022a), many restoration and protection actions have been implemented in freshwater habitat, but those actions have yet to change current trends in habitat quality, quantity, and function. The proposed restoration project does not address the permanent loss of forage habitat for the other six salmon and steelhead species considered in this opinion. Nevertheless, we acknowledge that proposed restoration work in Coppei Creek may have significant value for MCR steelhead, but that action is not evaluated in this opinion.

Based on our analysis that considers the current status of PBFs, adverse effects from the proposed action will cause a temporary and localized decline in the quality and function of juvenile forage habitat in the action area for about 1.12 acres, and a permanent loss of the quality and function of forage habitat for approximately 0.92 acres. However, because of the scale and extent of the effects to PBFs, and the expected recovery of 1.12 acres of juvenile forage habitat, 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 the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR steelhead, SRB steelhead, and MCR steelhead, or destroy or adversely modify designated critical habitat for these species and SR sockeye salmon.

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 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 this biological opinion, NMFS determined that incidental take of juvenile salmon and steelhead is reasonably certain to occur and will include capture and handling, and potentially injury or death, from work area isolation and fish salvage activities. NMFS is reasonably certain the incidental take described here will occur because: (1) juveniles of the ESA-listed species are known to occur in the action area while work area isolation and fish salvage activities will occur and may be subject to handling during removal; and (2) work area isolation and fish salvage activities can injure or kill juvenile salmon and steelhead.

Incidental Take from Fish Salvage

Fish salvage is included in this project to avoid or minimize injury or death to fish due to work area isolation (i.e., building and dewatering the cofferdam). NMFS expects that a very small number of juvenile UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR steelhead, SRB steelhead, and MCR steelhead may be present in the immediate work area during work area isolation. NMFS does not expect that any adult or juvenile SR sockeye salmon will be present in the action area during fish salvage operations. Fish salvage will be implemented following the protocols and guidelines identified in NMFS (2020a). However, individual fish that are present and trapped inside the cofferdams may experience stress, injury, or mortality from these efforts. While captured fish can be counted, it is difficult to identify and quantify the number of fish with internal injuries. This uncertainty makes it difficult to quantify take in terms of numbers of individual juvenile fish injured or killed. Therefore, we use a surrogate for the incidental take. The surrogate is the square footage of the isolated work area and is causally linking to the take pathway because the scale of the effect is related to the size of the area isolated. Thus, NMFS will consider the extent of incidental take due to fish salvage exceeded if the proposed action results in more than 11,060 square feet of work area isolated. While this surrogate is coextensive with the proposed action, it functions as an effective reinitiation trigger because the area isolated will be monitored as it is happening, and the Corps is obligated to notify NMFS and stop all activities if the extent of take is exceeded.

2.9.2. Effect of the Take

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

2.9.3. Reasonable and Prudent Measures

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

1. Minimize take from fish salvage operations.
2. Track, monitor, and report on the project to ensure that the project is implemented as proposed, all BMPs and Conservation Measures are followed, 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 Corps 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 (fish salvage operations):
    a. The Corps, or its permittee, shall ensure that the protocols and guidelines found in Section 3.1.2, *Work Area Isolation and Fish Salvage*, of the Bonneville Power Administration's *FY 23 Habitat Improvement Program Handbook* are followed as feasibly possible.
    b. The Corps, or its permittee, shall ensure that all fish captured during work area isolation and fish salvage activities be returned to the Columbia River outside of the area impacted by in-water construction activities and within waters with similar water quality and cover habitat from where they were collected.
    c. The Corps, or its permittee, shall ensure that the total area isolated does not exceed 11,060 square feet.

2. The following terms and conditions implement RPM 2 (project monitoring and reporting):

    a. The Corps, or its permittee, shall submit a completion of project report to NMFS two months, at most, after project completion. The completion report shall reference consultation number WCRO-2023-01082 and be sent to:

crbo.consultationrequest.wcr@noaa.gov. At minimum, the completion report shall include the following:

   i. Starting and ending dates for work completed, with in-water work period specified.
   ii. Summary and details of work area isolation and fish salvage operations, including total area of channel isolated, number and species of fish salvaged, and number and species of fish observed injured or dead.

b. If the amount or extent of take is exceeded, the Corps, or its permittee, shall stop project activities and notify NMFS immediately.

2.10. Conservation Recommendations

NMFS has no conservation recommendations.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Legrow Water Supply Relocation Project.

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 taking specified in the incidental take statement 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 biological 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 Corps and descriptions of EFH for Pacific Coast Salmon (PFMC 2014), contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The proposed project action area includes EFH for various life history stages of Chinook salmon (*O. tshawytscha*) and coho salmon (*O. kitsutch*) (PFMC 2014).

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 and benthic habitat.

The proposed action is described in Section 2, Project Description (pages 3–13), in the BA (DEA 2023), and entails the following:

- The existing stainless steel wedge wire intake fish screens will be removed and installed in the proposed new location; the screens will meet current NMFS screen criteria.
- New pipe manifolds will be installed to support the existing screens at the new site.
- Three, 60-inch-diameter pipes will be installed from the east shoreline (left bank) 2,600 feet west into the river channel.
- Dredging will be required along a portion of the route to avoid exposure of new pipe during minimum water surface elevations.
- A new pump station will be constructed on shore, landward of the existing railroad tracks.
- Three 72-inch-diameter casings will be bored beneath the existing shoreline railroad tracks and terminate below the waterline on the river side of the tracks for installation of the 60-inch-diameter pipes beneath the tracks.
- Pumps, motors, and electrical equipment from the existing pump station will be moved to the new pump station and the existing pump station abandoned.
- Installation of two 4-inch-diameter HDPE conduits that will extend to the intake screens to power their cleaning mechanism.
- The water withdrawal volume and rate will not change.

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

1. Short-term elevation of turbidity and sedimentation up to 300 feet downstream from the project area and construction activities.
2. Permanent loss of about 39,937 square feet (0.92 acre) of juvenile Chinook and coho salmon forage habitat.

3.3. Essential Fish Habitat Conservation Recommendations

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

We provide the following EFH conservation recommendations:

1. To minimize adverse effects to EFH due to operation of heavy equipment, in-water construction, and sediment disturbance, conduct project monitoring as follows:
   a. For heavy equipment:
      i. Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area 150 feet or more from any stream, waterbody or wetland to the extent practicable, or on an adjacent hardened area or established road.
      ii. All vehicles operated within 150 feet of any stream, waterbody or wetland must be inspected daily for fluid leaks. Any leaks detected must be repaired before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by NMFS.
      iii. All equipment operated must be cleaned before beginning operations to remove all external oil, grease, dirt, and mud.
   b. For turbidity:
      i. Monitoring will be conducted daily, when in-water work is conducted.
      ii. Observations shall occur daily before, during, and after commencement of in-water work and compared to observable sediment load entering the action area.
      iii. Measure or observe background turbidity levels at an undisturbed site within the flow channel.
      iv. Measure or observe compliance measures in the flowing channel approximately 300 feet downstream from the project area, or within any visible turbidity plume.
      v. If a visible plume is observed at 300 feet downstream, measurements should not exceed 10 percent of the background measurements. If there is exceedance, BMPs will be modified to minimize downstream increase of turbidity and fine sediments. Monitoring will be continued every 4 hours. If plume is observed after 8 hours, work shall be stopped for the remainder of the 24-hour day.
   c. For spill prevention:
      i. The Spill Prevention, Control, and Countermeasures Plan shall be prepared and implemented, commensurate with the scope of the project.

2. Ensure that the permanent reduction of forage habitat due to the proposed action does not exceed 0.95 acres.

3. Implement RPM 2 and its terms and conditions described in the ITS in the ESA portion of this document to ensure completion of monitoring and reporting and confirm that adverse effects to EFH were avoided and minimized.

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

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Corps must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of 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 Corps 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 user of this opinion is the Corps. Other interested users include the Yakama Nation and the Confederated Tribes of the Umatilla Reservation. Individual copies of this opinion were provided to the Corps. The document will be available within two 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 the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR part 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 reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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