UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232-1274

Refer to NMFS No: WCRO-2022-00921

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June 13, 2023

Daniel M. Mathis, P.E.
Division Administrator
Federal Highway Administration
Suite 501 Evergreen Plaza
711 South Capitol Way
Olympia, Washington 98501-1284

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Confluence Parkway Project, Wenatchee, Washington.

Dear Mr. Mathis:

Thank you for your letter of March 31, 2022, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Confluence Parkway Project, located in the city of Wenatchee, Chelan 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.

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

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*) or UCR steelhead (*O. mykiss*). NMFS also determined the action will not destroy or adversely modify designated critical habitat for these species. We provide rationale for our conclusions in the attached opinion. The enclosed opinion

is based on information provided in your biological assessment, requested additional information, and other sources of information cited in the opinion.

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 (RPMs) 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 Federal Highway Administration and any person who performs the action must comply with to carry out the RPMs. Incidental take from the proposed action that meets these terms and conditions will be exempt from the ESA take prohibition.

Please contact Scott Carlon at (971) 322-7436 or scott.carlon@noaa.gov, if you have any questions concerning this consultation or require additional information.

Sincerely,

Nancy L Munn

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

Enclosure

cc: William Witucki, FHWA (william.witucki@dot.gov)
Cindy Callahan, FHWA (cindy.callahan@dot.gov)

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

Confluence Parkway Project, Wenatchee, Washington

NMFS Consultation Number: WCRO-2022-00921

Action Agency: Federal Highway Administration

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Upper Columbia River steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No
Upper Columbia River Chinook salmon (*O. tshawytscha*)	Endangered	Yes	No	Yes	No

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

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: Nancy L Munn

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

Date: June 13, 2023

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GLOSSARY OF ACRONYMS

BA	Biological Assessment
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe
CHART	Critical Habitat Analytical Review Team
Chelan PUD	Public Utility District No. 1 of Chelan County
dB	Decibel
dbh	diameter at breast height
DDE	4,4'-dichlorodiphenyldichloroethylene
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FHWA	Federal Highway Administration
FHWG	Fisheries Hydroacoustic Working Group
FR	Federal Register
HUC	Hydrologic Unit Code
ICRD	Interior Columbia Recovery Domain
ITS	Incidental Take Statement
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NTU	Nephelometric Turbidity Units
NWFSC	Northwest Fisheries Science Center
OHWM	Ordinary High Water Mark
Opinion	Biological Opinion
PAH	Polycyclic Aromatic Hydrocarbon
PBF	Physical or Biological Feature
PCB	Polychlorinated Biphenyl
PCE	Primary Constituent Element
Project	Confluence Parkway Project
RM	River Mile
RMS	Root Mean Square
RPM	Reasonable and Prudent Measure
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SR	State Route
UCR	Upper Columbia River
UCSRB	Upper Columbia Salmon Recovery Board
USFWS	U.S. Fish and Wildlife Service
VSP	Viable Salmonid Population
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington Department of Transportation

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1. INTRODUCTION

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

1.1. Background

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 office.

1.2. Consultation History

NMFS received the Federal Highway Administration's (FHWA) request for consultation for the Confluence Parkway Project (Project) on March 24, 2021. The request included a biological assessment (BA) prepared by the city of Wenatchee in coordination with the Washington State Department of Transportation (WSDOT) and the FHWA. The proposed Project is located in the city of Wenatchee, Chelan County, Washington.

Following initial review of the BA, NMFS submitted a request for additional information via letter on May 3, 2021. This letter was followed by coordination meetings to discuss additional information needs with the FHWA, the city of Wenatchee, the Public Utility District No. 1 of Chelan County (Chelan PUD), and the U.S. Fish and Wildlife Service (USFWS) on September 3, 2021, October 1, 2021, and October 20, 2021. Subsequently, NMFS submitted a December 7, 2021 letter to the FHWA closing the consultation to continue developing information needs for the Project.

NMFS received a new consultation request from the FHWA on March 21, 2022. Another coordination meeting was held with the FHWA and the USFWS on June 12, 2022, to discuss further information requirements to initiate formal consultation. Lastly, on September 13, 2022, NMFS determined that it had all the information required and initiated formal consultation.

The FHWA concluded that the proposed action is "likely to adversely affect" UCR spring-run Chinook salmon (*Oncorhynchus tshawytscha*) and UCR steelhead (*O. mykiss*) and designated critical habitat for these two species. The FHWA also concluded that EFH for Pacific salmon, as designated by Section 305 of the MSA, is likely to be adversely affected.

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 FHWA proposes to fund the project.

1.3.1. Project Overview

The Project is a proposed 2.5-mile bypass of SR 285 in the city of Wenatchee, Chelan County, Washington. Wenatchee is located in central Washington near the confluence of the Columbia and Wenatchee rivers. The bypass will consist of a new, two-lane street that will begin on Euclid Avenue north of the Wenatchee River, cross the river on a newly constructed bridge, and extend south to Miller Street (Figure 1). The proposed bypass will be approximately 32 feet wide, including two travel lanes, sidewalks, and pedestrian and bicycle facilities. The project also includes removal of an existing pedestrian bridge. Portions of the Project will run adjacent to the Burlington Northern Santa Fe (BNSF) Railroad, the Wenatchee Confluence State Park, and the Horan Natural Area.

Construction is expected to begin in 2025 and may take up to three years to complete. In-water work will be conducted within the Washington Department of Fish and Wildlife's (WDFW) designated in-water work window of July 15 through September 30. In-water work is expected to be completed over three in-water work window periods. Project elements completed during each in-water work window include the following:

- Year 1:
    - Construct temporary work access trestle for the new bridge.
    - Construct temporary work access trestle for removal of the pedestrian bridge.
    - Install drilled shafts.
- Year 2:
    - Remove temporary work access trestle for the new bridge.
- Year 3 (if demolition cannot occur during year 2):
    - Demolish the existing pedestrian bridge.
    - Remove temporary work access trestle for removal of the pedestrian bridge.

1.3.2. New Bridge Construction

A significant portion of the proposed action will occur above the ordinary high water (OHWM). The new bridge will be placed about halfway between the BNSF railroad bridge and the current pedestrian/bicycle bridge (Figure 2). The following descriptions of the new bridge construction

and demolition are largely taken from the BA (Anchor QEA 2021a) and supplemental information memorandum (Anchor QEA 2022).

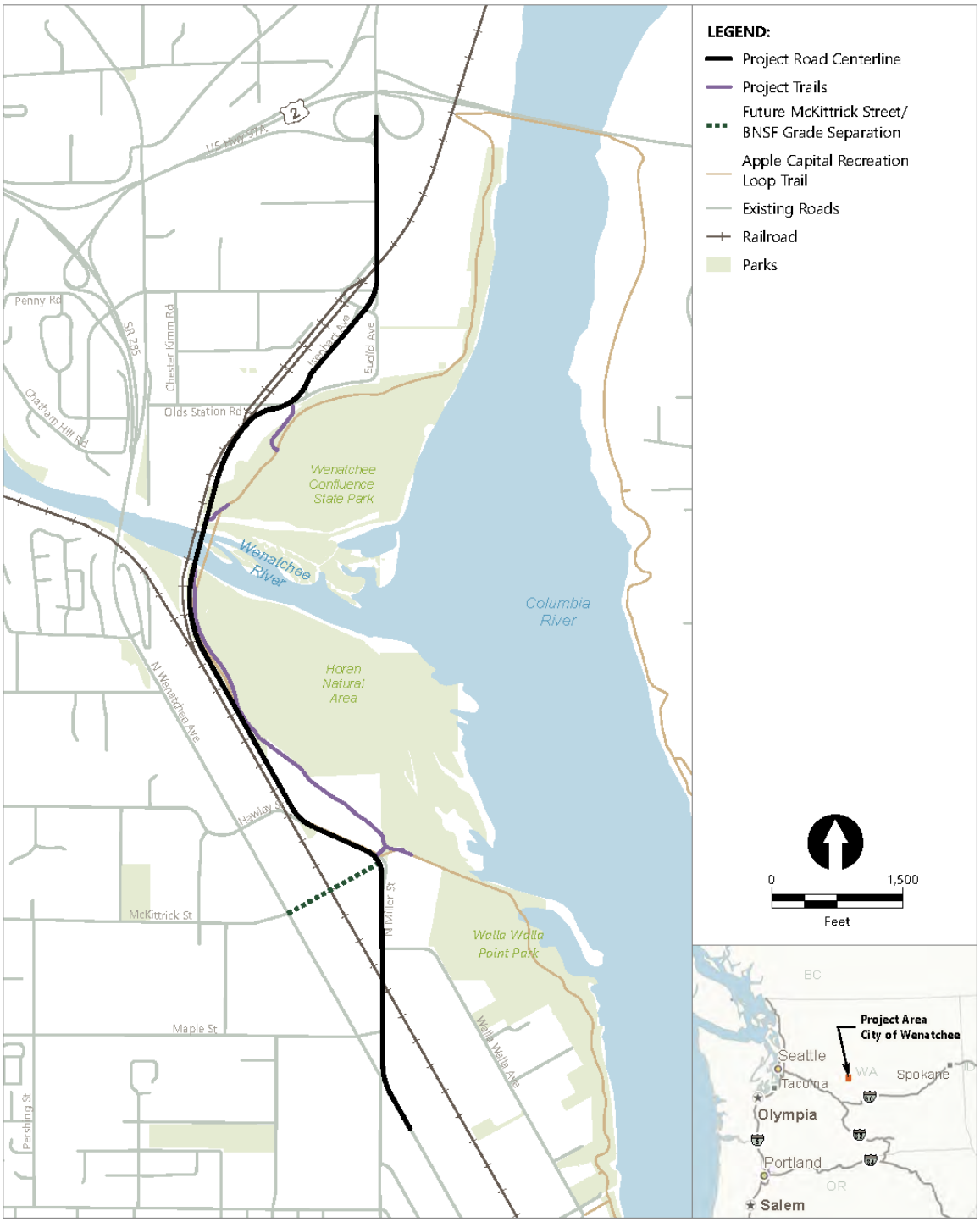

Figure 1. Confluence Parkway Project, Wenatchee, Washington, Project area. (Source: Anchor QEA 2021a).

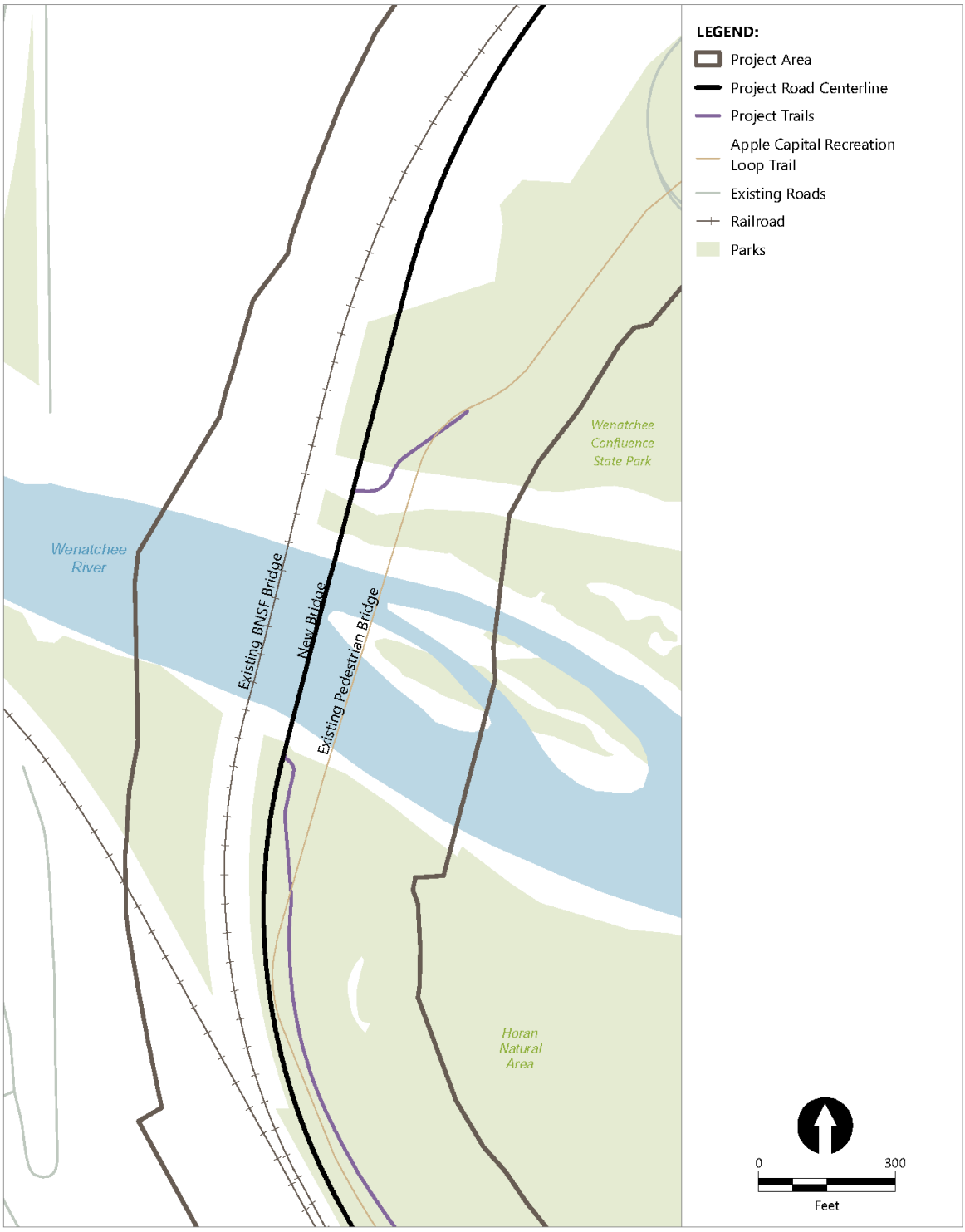

Figure 2. Existing Burlington Northern Santa Fe (BNSF) railroad bridge, pedestrian bridge, and new proposed bridge, Wenatchee River. (Source: Anchor QEA 2021a)

The new bridge will be supported by three, in river piers on drilled shaft foundations. The bridge will be approximately 680 feet long and support a 32-foot-wide roadway. The Wenatchee River is roughly 525 feet wide at the proposed bridge location. The superstructure will consist of either

precast, prestressed concrete girders or steel plate girders. The roadway will be carried by a cast-in-place concrete bridge deck. The substructure at the intermediate piers consists of single column piers supported on drilled shafts. Drilled shafts are constructed by installing three, 10-foot-diameter steel casings, excavating the soil and sediment from within each casing, and placing steel and concrete within the excavated casings, permanently removing about 235.5 square feet of habitat. To isolate this work from the river, three temporary cofferdams consisting of 14-foot-diameter steel casings will be placed around the perimeter of the primary drill shaft casings. This will temporarily remove an additional 226.5 square feet of habitat.

Placement of the 10-foot-diameter casings and 14-foot-diameter steel cofferdams will be completed during the first in-water work period using either a vibratory hammer or oscillator. About 9 days will be needed to complete installation. The bridge abutments will be located above the ordinary high water mark (OHWM) and installed on spread footings or drilled shafts.

New Bridge Work Trestle Installation and Removal

Construction of the bridge foundations, columns, pier caps, and girders will require the installation of a temporary, pile-supported work access trestle. The trestle will be about 475 feet long and 30 feet wide. Three trestle extensions will be provided at each pier to facilitate construction of the drilled shafts and columns. Each extension is approximately 30 feet wide and 40 feet long. Construction will consist of driving steel pipe piles then adding steel framing that support timber decking.

The temporary work access trestle will be installed during the first in-water work period. The number and size of steel piles placed within the OHWM that are used for the temporary work trestle are based on current design information and conservative estimates regarding the number of piles required. It is anticipated that up to 200, 24-inch-diameter steel piles will be needed and will be driven first with a vibratory hammer. Any piles that cannot be driven to depth with a vibratory hammer will be finished with an impact hammer. All piles will be proofed with an impact hammer. It is estimated that four piles can be placed each day, taking a total of 50 days to install all 200 piles. Piles will not be installed until one hour after sunrise, and will cease being installed one hour prior to sunset.

The work trestle will be dismantled and a vibratory hammer employed to remove the casings, cofferdams, and trestle piles during the second in-water work period.

1.3.3. Existing Pedestrian Bridge Removal

The existing pedestrian bridge is a four span structure that is approximately 600 feet long and carries an 8-foot-wide walkway. The superstructure consists of precast, prestressed concrete girders. The substructure consists of intermediate single column piers supported on 6-foot-diameter drilled shafts. The abutments are also supported on drilled shaft foundations. The pedestrian bridge has five piers, one at each bridge abutment above the OHWM and three located below the OHWM.

If time allows, the pedestrian bridge demolition will occur during the second in-water work window, but a third in-water work window to perform the demolition may be necessary.

Demolition will include installation of three, temporary 20-foot by 20-foot sheet pile cofferdams to contain debris during demolition of the piers. The cofferdams will be installed with a vibratory hammer and temporarily impact about 1,200 square feet of habitat. Existing concrete support shafts will be removed to 2 feet below the river bottom. Pedestrian bridge demolition will require installation of a temporary work trestle.

Pedestrian Bridge Temporary Work Trestle

The temporary work trestle will be approximately 600 feet in length and 25 feet wide and supported by 185, 24-inch-diameter steel piles. The piles will be driven first with a vibratory hammer. Any piles that cannot be driven to depth with a vibratory hammer will be finished with an impact hammer. All piles will be proofed with an impact hammer. It is estimated that four piles can be placed each day, taking a total of about 47 days to install all 185 piles.

Once the pedestrian bridge and piers are removed, the sheet pile cofferdams and work trestle piles will be removed with a vibratory hammer.

1.3.4. Vegetation Removal and Fish Salvage

Vegetation Removal

The Project will require clearing riparian vegetation on both sides of the Wenatchee River. Some of the vegetation removal will be permanent and some areas will be replanted. Within the first 100 feet moving inland from both shorelines, about 0.12 acres of vegetation will be permanently lost on each side of the river (0.24 acres total). In the zone measuring from 100 feet to 200 feet inland from the shorelines, roughly 0.42 acres will be permanently lost on the left bank (looking downstream) and 0.25 acres lost on the right bank (0.67 acres total). Overall, a little under an acre (0.91 acres) of vegetation will be permanently lost within the first 200 feet inland from both shorelines (Anchor QEA 2022).

Other portions of the impacted riparian area will be revegetated with species native to Chelan County following construction. In the first 100 feet inland from the left bank, about 0.44 acres will be replanted and 0.35 acres replanted on the right bank (0.79 acres total). Within the 100-foot to 200-foot inland zone, approximately 0.18 acres will be replanted on each side of the river (0.36 acres total). In total, about 1.05 acres will be revegetated after construction (Anchor QEA 2022).

Overall, roughly 0.91 acres of vegetation will be permanently removed within the 200-foot riparian zone and about 1.05 acres will be replanted.

Fish Salvage

Each area enclosed with cofferdams may entrap fish (1,200 square feet total). These fish will be captured using various methods including seining, dip netting, and electrofishing. Captured fish will be relocated outside of the immediate construction area. Salvage will be implemented and managed by a fish biologist.

1.3.5. Stormwater Management

The entire Project corridor will include new stormwater facilities to treat stormwater runoff from Project impervious surfaces. These facilities will remove sediments and pollutants as required by the state of Washington and the city of Wenatchee. Treated stormwater will be discharged into both the Columbia and Wenatchee Rivers through existing outfalls.

1.3.6. Impact Minimization Measures

The following impact minimization measures and best management practices (BMPs) will be employed during construction of the Project:

- As previously noted, all in-water work will occur during the WDFW approved work window of July 15 to September 30, and work will only occur during daylight hours.
- The contractor will be responsible for the preparation and implementation of a Spill Prevention, Control, and Countermeasures plan to be used for the duration of the Project. The plan will be submitted to the Project engineer prior to the commencement of any construction activities. A copy of the plan with any updates will be maintained at the work site by the contractor.
- Excess or waste materials will not be disposed of or abandoned waterward of the OHWM or allowed to enter waters of the State.
- No petroleum products, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials will be allowed to enter surface waters.
- Erosion control measures will be addressed in a Temporary Erosion and Sediment Control plan approved by the city of Wenatchee, prepared and updated by the contractor and implemented during construction.
- Demolition and construction materials will not be stored where upland runoff enter surface waters.
- The contractor will be required to employ full containment measures to prevent bridge demolition debris from falling into the river.
- Temporarily cleared areas will be restored by replanting the areas with native herbaceous and woody species.
- Clearing limits will be defined with orange barrier fencing wherever clearing is proposed in or near critical areas.
- All staging areas will be located outside of streams, wetlands, and their buffers.
- Impact hammer use will be minimized during in-water pile installation, and a vibratory pile driver will be maximized as substrate conditions allow, with proofing as necessary using an impact hammer.
- Where necessary, dewatering and approved fish handling methods applying NMFS' electrofishing guidelines and WSDOT protocols will be conducted.
- Sound attenuation measures will be used for in-water impact pile driving, including, but not limited to: confined bubble curtains, cushion blocks, etc., to reduce peak noise levels.
- Piles will not be installed until 1 hour after sunrise and will cease being installed 1 hour prior to sunset.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would result in a small volume of additional traffic over the lower Wenatchee River.

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 UCR spring-run Chinook salmon and UCR steelhead use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced 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

In this opinion we examine 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. We also examine the condition of critical habitat throughout the designated area, evaluate the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discuss 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 of UCR spring-run Chinook salmon and UCR steelhead and their designated critical habitat 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; UCSRB 2007), and the viability analysis prepared by the Northwest Fisheries Science Center (NWFSC) for the status reviews (Ford 2022). 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 decision notices for ESA-listed species considered in this opinion.

Species	Listing Status	Critical Habitat	Protective Regulations
UCR spring-run Chinook salmon	Endangered 3/24/1999; 64 FR 14308	9/02/05; 70 FR 52630	ESA section 9 applies
UCR steelhead	Threatened 1/5/2006; 71 FR 834	9/02/05; 70 FR 52630	2/1/06; 71 FR 5178

Upper Columbia River Spring-run Chinook Salmon Evolutionarily Significant Unit

The UCR spring-run Chinook salmon evolutionarily significant unit (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 2022).

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 2022). An emerging risk is climate change and the consequent threat to the juvenile rearing stage vulnerable to low stream flow and high stream changes. 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 2022). 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, although the 95-percent confidence intervals include 0 (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 2022). We remain concerned with habitat conditions throughout the range of the UCR steelhead distinct population segment (DPS) and UCR spring-run Chinook salmon ESU, particularly with regard to 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 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 2022).

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-around 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—in particular, 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.

Upper Columbia River Steelhead Distinct Population Segment

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 2022). 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 2022). An emerging risk is climate change and the consequent threat to the juvenile rearing stage vulnerable to low stream flow and high stream changes. 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 2022).

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 *O. 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. In order to achieve recovery, it is essential to continue implementing habitat protection and restoration actions directed at key limiting factors.

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 Upper Columbia River (UCR) spring-run Chinook salmon and UCR steelhead and corresponding species life history events in the Confluence Parkway Project area.

Physical and Biological Features		**Species Life History Event**
Type	**Attribute**	
Freshwater Rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry/parr/smolt growth and development
Freshwater Migration	Free of artificial obstruction Natural cover Water quality Water quantity	• Adult upstream migration and holding • Steelhead kelt seaward migration • Fry/parr/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 and UCR steelhead. 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.

The complex life cycle of UCR spring-run Chinook salmon and UCR 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).

Upper Columbia River spring-run Chinook salmon and UCR steelhead have lost access to large blocks of their historical habitat. The construction of Chief Joseph and Grand Coulee Dams blocked fish access to historical habitat in the upper Columbia River and its major tributaries. Many smaller dams, and some temporary dams, were also built on tributaries at this time without fish passage facilities and had the same effects, though on much smaller scales. The loss of this historical habitat significantly reduced the spatial structure that was once available to the species.

Construction of other large hydropower and water storage projects associated with the Columbia River System further affected salmonid migratory conditions and survival rates. The production of UCR spring-run Chinook salmon and UCR steelhead 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 four major Federal dams and

reservoirs in the mainstem lower Columbia River and the five Public Utility District-owned dams in the upper Columbia River migration corridor.

Many stream reaches designated as critical habitat in the Interior Columbia Recovery Domain 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's Clean Water Act Section 303(d) lists for water temperature. Many areas that were historically suitable 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 ESU or DPS.

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 11 salmon and steelhead species considered in this opinion (NMFS 2005b).

Species	Designation Date and Federal Register	Critical Habitat Status Summary
Upper Columbia River spring-run Chinook salmon	9/02/2005 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[1] watersheds with physical or biological features for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005b). However, most of these watersheds have some, or high, potential for improvement. We rated 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.

Species	Designation Date and Federal Register	Critical Habitat Status Summary
Upper Columbia River steelhead	9/02/2005 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 physical or biological features for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005b). 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.

[1]HUC5=fifth-field hydrologic unit code

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, 2020b; Scott 2020). Thermal gradients (i.e., rapid change to elevated water temperatures) encountered while passing dams via fish ladders can slow, reduce, or altogether stop the upstream movements of migrating salmon and steelhead (Caudill et al. 2013). Additional thermal loading occurs when mainstem reservoirs act as a heat trap due to upstream inputs and solar irradiation over their increased water surface area (EPA 2020a, 2020b, 2021). Consider the example of 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). 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). 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 aquatic zone of impact beginning at roughly 0.5 miles upstream of the BNSF railroad bridge on the Wenatchee River, downstream approximately 1 mile to the east bank of the Columbia River, about 1.5 river miles in total (Figure 3).

Figure 3. Action area defined in the hatch marked area, for the Confluence Parkway Project, Wenatchee, Washington. (Source: Anchor QEA 2021a)

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 Wenatchee River subbasin originates in the east Cascade Mountains in central Washington within Chelan County. The river runs roughly 53 miles from the outlet of Lake Wenatchee and flows through the north end of the city of Wenatchee immediately before entering the Columbia River at river mile (RM) 470. The subbasin covers approximately 849,777 acres and contains nearly 231 miles of major streams with approximately 163 miles of stream accessible to anadromous fish. Approximately 81 percent of the Wenatchee subbasin is in Federal (primarily U.S. Forest Service) and State ownership. The remaining 19 percent of the lands in the subbasin are in private ownership (NPPC 2004).

As reported in the 2016 5-year review (NMFS 2016), the primary habitat conditions in the Wenatchee River subbasin, including the action area, that currently limit abundance, productivity, spatial structure, and diversity of salmon and steelhead include a lack of habitat diversity and quantity, excessive sediment load, obstructions, a lack of channel stability, low flows, and high summer water temperatures. Habitat diversity is affected by channel confinement, loss of floodplain connectivity and off-channel habitat, reduced quantities of large wood, and a lack of riparian vegetation. The Wenatchee River and many of its tributaries also lack high-quality pools and spawning areas associated with pool tail-outs. The lack of pools is probably directly related to the loss of riparian vegetation, removal of large wood, and channel confinement. Since the 2016 5-year review, the habitat concerns remain essentially unchanged for the Wenatchee River population.

In the action area, the Wenatchee River is currently on the Clean Water Act 303(d) list of impaired water bodies for temperature, pH, 4,4'-dichlorodiphenyldichloroethylene (DDE) and polychlorinated biphenyls (PCBs). The Columbia River in the action area is also listed for DDE, PCBs, and temperature (Anchor QEA 2021b). The area of the Columbia River near and within the action area serves primarily as an adult and juvenile migration corridor for UCR spring-run Chinook salmon and UCR steelhead. A portion of spring-run Chinook salmon pre-smolts from the Wenatchee subbasin use this portion of the Columbia River to overwinter before migrating to the Pacific.

The stream's substrate in the action area includes cobble, gravel, sand, and silt material. Water flow through the construction site is fairly swift until it reaches the backwater of the Rock Island Dam reservoir immediately downstream. The action area does not provide any spawning habitat for the listed species, but may serve as overwintering habitat for some juvenile spring-run Chinook salmon. The action area primarily serves as a migration corridor for adults and juveniles. Daily mean stream temperature in the lower Wenatchee River during the in-water work period (July 15–September 30) can exceed 23°C. Stream temperatures do begin to moderate (below 18°C) by mid to late September.

The Wenatchee River 's banks near the proposed bridge consist of a steep, narrowly vegetated corridor between the Apple Capital Recreation Loop Train and BNSF railroad bridge abutments. Riparian vegetation is present upstream and downstream of the existing pedestrian and BNSF bridges. Riparian area along the right and left banks has a dense tree canopy dominated by black hawthorn, black cottonwood, yellow willow, and narrow leaf willow. Black hawthorn and willow, the most common riparian tree species in the Project Area, have a diameter at breast height (dbh) up to about 12 inches. Some black cottonwood trees have a dbh up to about 30 inches. Dominant understory vegetation includes red osier dogwood, Woods' rose, Himalayan blackberry, and reed canary grass (Anchor QEA 2021a).

The Wenatchee River spring-run Chinook salmon population is part of the North Cascades MPG of UCR spring-run Chinook salmon. The Wenatchee River spring-run Chinook salmon population's recent 10-year geomean (2010–2019) is currently 630 natural spawners. This is only 31.5 percent of its recovery target of 2,000 natural spawners, and a 49 percent decrease

from the last 5-year review (Ford 2022). The most recent 20-year geometric mean (2000–2019) of productivity is 0.89, below the recovery threshold of 1.2 spawners per parent.

The Wenatchee River summer steelhead population is part of the Northern Cascades MPG of the UCR summer steelhead DPS. The Wenatchee River summer steelhead recent 10-year geomean (2010–2019) is currently 931 natural spawners. This is 93 percent of its recovery target of 1,000, and a 63 percent decrease from the last 5-year review (Ford 2022). The most recent 20-year geometric mean (2000–2019) of productivity is 0.95, below the recovery threshold of 1.1 spawners per parent.

2.5. Effects of the Action

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

Effects to ESA-listed salmon and steelhead and critical habitat include: (1) injury and death from fish salvage operations; (2) water quality impacts from elevated total suspended solids and increases in turbidity; (3) disturbance and displacement from increased sound levels during steel pile installation; (4) behavior modification from temporary in-water and overwater structures, and from permanent in-water structures; (5) temporary alteration of fish passage and migration from sound and presence of in-water and overwater structures; and (6) increased risks to water quality and UCR spring-run Chinook salmon and UCR summer steelhead from toxic spills.

2.5.1. Effects on Species

Presence and Exposure

Project construction is expected to take 2 to 3 years to complete. In-water work will occur each year during the WDFW in-water work window of July 15 through September 30. Both UCR spring-run Chinook salmon and UCR steelhead use the action area for migration and rearing. Neither species spawns in the action area.

Adult UCR spring-run Chinook salmon and steelhead in the action area. Most, if not all, adult UCR spring-run Chinook salmon have passed the action area by early July before the onset of in-water work (July 15). Therefore, we do not expect adult UCR spring-run Chinook salmon to be present during in-water construction nor exposed to project construction effects.

About half of the adult UCR steelhead have passed Rock Island Dam, nearly 17 miles below the mouth of the Wenatchee River, by the first week of September. Adult migration is normally delayed when water temperatures reach or exceed 21°C (69.8ºF). Peak daytime water temperatures in the action area normally reach or exceed 21°C (69.8ºF) from mid-July to early

September.[1] Thus, we do not expect adult steelhead to be moving through the Wenatchee River section of the action area during the daytime hours when in-water work occurs, due to the absence of holding habitat (low river flow) and elevated water temperatures. It is expected that adult steelhead would move through the action area during the night or early morning hours when water temperatures have decreased by 3°C to 4°C (5 to 7ºF). We also expect adult steelhead will be holding in the Columbia River near the mouth of the Wenatchee River and may encounter noise from pile driving. The last half of the adult steelhead run destined for the Wenatchee River will encounter suitable stream temperatures for migration. Therefore, we expect adult steelhead to be present and potentially exposed to project effects.

Juvenile UCR spring-run Chinook salmon and steelhead in the action area. Juvenile spring-run Chinook salmon and steelhead use the action area year-round for migration and rearing. Some pre-smolt spring-run Chinook salmon may overwinter in the action area when there is no in-water work occurring, but most juvenile spring-run Chinook salmon smolts and juvenile steelhead smolts will have outmigrated through the action area prior to the start of the in-water work period (July 15). Few, if any, juveniles from either species are expected to be present during the in-water work window, due to (1) the absence of suitable rearing habitat (e.g., no deep pools, shallow and swift water, primarily a silt/sand substrate, and little riparian cover), and (2) elevated summer temperatures (greater than 20°C) will likely preclude the presence of most juvenile salmon and steelhead.

Fish Salvage

The primary area of in-water work, which is installation of new bridge piers and removal of the existing pedestrian bridge piers, will be isolated with steel casings and sheet pile cofferdams and dewatered. Prior to dewatering the area behind the cofferdams, fish will be captured and relocated. Capture methods may include seining, dip netting, and electrofishing. The fish salvage is included in this Project to avoid or minimize injury or death to fish due to dewatering. We do not expect adult fish to be in the primary work area during cofferdam placement and dewatering. Additionally, we expect that few juvenile spring-run Chinook salmon or steelhead will be present. The absence of adult and juvenile fish would be mainly due to the lack of adult holding and juvenile rearing habitat, shallow and swift water, and elevated water temperatures. Fish salvage will be carried out by a qualified fish biologist and performed according to WSDOT Fish Exclusion Protocols and Standards (WSDOT 2016). However, individual fish that are present and trapped inside the cofferdams (1,200 square feet) may experience stress, injury, or mortality from salvage operations. Therefore, we expect a very small number of juvenile UCR steelhead and UCR spring-run Chinook salmon to be injured or killed by fish salvage operations in 1,200 square feet.

Water Quality

Sedimentation and turbidity. Activities associated with temporary pile installation and removal for work trestles, new bridge pier installation and temporary casing removal, and existing

[1]U.S. Geological Survey stream gauge 12462500 at Monitor, Washington, RM 5.5, at USGS Current Conditions for USGS 12462500 WENATCHEE RIVER AT MONITOR, WA

pedestrian bridge pier removal, will temporarily disturb soil and riverbed sediments, potentially resulting in temporary increases in turbidity and suspended sediments in the action area. Turbidity plumes are expected to affect a portion of the channel width, extend up to 300 feet downstream of the disturbed site, and last for about 30 minutes or less due to the slow movement of water (Rock Island reservoir backwater) immediately downstream of the Project 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).

NMFS expects all fish in the area to be mobile enough to avoid the spatially limited turbidity, and that most individual fish that encounter elevated turbidity or sediment concentrations will display avoidance behaviors and move away from affected areas into more suitable surrounding habitat.

In-water work will only occur from July 15 to September 30, when water temperatures are highest and few juvenile salmon and steelhead will be present due to unsuitable habitat and daytime stream temperatures greater than 20°C; and, in addition, avoidance and minimization techniques will be implemented in this Project as well as BMPs (e.g., silt curtains) pertaining to the minimization of sedimentation and turbidity. Furthermore, pile driving will only occur during a subset of days during the work window, which will limit the duration of the turbidity effects;

and water quality will be monitored during construction to comply with Washington Department of Ecology's 401 Water Quality Certification and other permit requirements.

NMFS expects few individual fish to be present in the action area, and any increases in turbidity associated with in stream work to be brief (lasting a few minutes to about half an hour), occur within 300 feet of the disturbed site, and attenuate downstream as suspended sediment settles out of the water column. Therefore, NMFS expects a few juvenile Wenatchee River spring-run Chinook salmon and Wenatchee River summer steelhead will experience short-term turbidity events (lasting a few minutes to about half an hour) within 300 feet that displaces them from preferred rearing habitat, resulting in an increased risk of predation and mortality.

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 Wenatchee and Columbia Rivers could harm fish. The operation of equipment and heavy machinery will occur from road decking, causeways, and temporary work trestles. NMFS anticipates that only very small quantities (ounces) of PAHs are likely to enter the stream with each accidental release or spill. In addition, conservation measures will be implemented to prevent or contain any spill that may occur (e.g., staging and fueling equipment in a protected location; emergency spill response kit available onsite, and containment measures to retain all debris from work platforms above the water). These will minimize the risk of a spill and 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. For these reasons, NMFS does not expect any fish to be injured or killed by exposure to accidental releases of fuel, oil, and other contaminants caused by this action.

Stormwater. During project construction, stormwater will be managed according to the Washington State Department of Ecology's *2019 Stormwater Management Manual for Eastern Washington*. This will include using BMPs for erosion control and stormwater management. Therefore, we expect only infrequent and small amounts of stormwater will enter the Wenatchee and Columbia Rivers during the 2 to 3 years of Project construction. All of the newly constructed corridor will include new stormwater facilities that treat runoff and connect to existing outfalls. Therefore, we do not expect stormwater to degrade water quality such that it impacts salmon or steelhead during or after project construction.

Shading

Juvenile salmon and steelhead rely heavily on light perception to orient themselves in space, capture prey, avoid predators, shoal, and migrate along the shoreline to the ocean (Ono and Simenstad 2014). The reduction of ambient light (e.g., light attenuation and shading) is one of the primary mechanisms by which overwater (bridge decking) and in-water structures (piers and pilings) adversely affect salmon and steelhead. Reduced light levels can impair fitness and survival in juvenile salmonids by altering certain behaviors, such as migration, feeding success,

and predator avoidance (Rondorf et al. 2010). Darkly shaded areas can delay fish migration and drive juvenile salmon into deeper waters during daylight. This, in turn, increases the risk of predation by exposing young salmon to larger fish and diving birds. Predators such as smallmouth bass and northern pikeminnow select and use in-water and overwater structures (Pribyl et al. 2004), and juvenile salmonids account for high portions of northern pikeminnow diets (Zimmerman and Ward 1999) and avian predator diets. Construction of overwater structures (e.g., docks and pilings) also creates habitat for predatory, perching birds such as cormorants and gulls.

Overwater shading of roughly 16,800 square feet will result from the new bridge and temporary work trestles. Reduced light may inhibit or alter migration pathways of juvenile salmonids, including delays due to disorientation, dispersal of schools, and a change in migratory routes into deeper waters. Overwater shading can also affect adult salmon and steelhead migration. At its lowest point of elevation, the new bridge will be approximately 13 feet above the OHWM. This will allow ambient light to penetrate underneath the bridge and reduce the shading effect (i.e., lighter shadow). Therefore, we do not anticipate shade from the Project structures will alter adult or juvenile salmon or steelhead migration.

Some pre-smolt, juvenile Chinook salmon may rear in the area during the late fall/winter months. However, the reach of the Wenatchee River where the new bridge and work trestles will be located is swift flowing water, lacking the habitat complexity and space for predators to hold and prey on juvenile salmon in the action area. In addition, the ambient light that will infiltrate under the bridge and significantly reduce hiding areas for ambush predators and piscivorous predators are largely inactive during these cold-water periods. Some piscivorous birds (e.g., gulls and cormorants) may perch on the new bridge and look for opportunities to prey on juvenile spring-run Chinook salmon and steelhead. While we have no way of knowing how many birds will take advantage of the bridge, the frequent disturbance from foot, bicycle, and vehicle traffic is expected to minimize the number of perching birds, and therefore significantly reducing their ability to prey on juvenile Chinook salmon and steelhead from the bridge. Therefore, we do not anticipate that shading from the Project structures or creation of perching areas will measurably increase risk from predation.

Riparian Vegetation

Riparian vegetation contributes to many attributes of productive salmonid habitat including shade, cover, and food production (Spence et al. 1996). Vegetation removal can increase sedimentation, remove cover, reduce large wood recruitment, and increase water temperatures. Riparian tree and shrub vegetation along the Wenatchee River, Columbia River, and associated side channels provide limited overhang for cover, shade, and food production, and is limited in the Project area zones directly adjacent to the shorelines. The Project will result in a total of 0.91 acres of vegetation permanently lost within the 200-foot riparian zone of both shorelines. A total of 1.05 acres will be replanted with native species within the 200-foot zone.

While more vegetation will be replaced than is lost, a total of 0.24 acres will be permanently lost within the first 100 feet of the shorelines. This will result in a slight loss of near shore shading and possible prey production. We anticipate this slight change to be minor in scope as most

salmon and steelhead (juvenile and adult) migrate quickly through the action area. The permanent loss of 0.24 acres of riparian habitat within the first 100 feet of the shorelines will not appreciably reduce near shore shading or prey production. Therefore, we do not anticipate any adverse effects to salmon or steelhead from this permanent loss of habitat.

Sound Pressure and Noise

Piles that are driven into riverbed substrate propagate sound through the water, which can cause sudden 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 reduced.

The Fisheries Hydroacoustic Working Group (FHWG), a multi-agency work group, identified criteria to define SPLs where effects to fish are likely to occur from pile-driving activities (FHWG 2008). The FHWG determined:

- Instant injury or death can occur from a single strike if peak level is at or above 206 decibels (dB).
- Injury to fish larger than 2 grams occurs at 187 dB sound exposure level (SEL), and at 183 dB SEL where fish are smaller than 2 grams, for cumulative strikes.
- "Harassment" threshold is 150 dB, where behavioral effects or potential physical injury (i.e., harm) to individual salmon or steelhead within a distance of the source may occur (FHWG 2008; Popper et al. 2006).

Vibratory and oscillator pile driving. Using the NMFS vibratory calculator, information provided in the BA, and data from analogous projects (CalTrans 2020), we estimate the behavioral threshold of 150 dB will not be exceeded during installation of 24-inch steel piles and steel casings. Therefore, we do not expect behavioral effects to adult or juvenile salmon or steelhead from vibratory or oscillator pile driving.

Impact pile driving. We used the NMFS hydroacoustic calculator, information provided in the BA, and data from analogous projects (CalTrans 2020) to determine distances individual fish may encounter effects from impact pile driving. Expected sound pressure levels (SPL) based on

information submitted in the BA and in CalTrans (2020) are discussed below. These data assume measurement occurs at 10 meters (33 feet), and a default transmission loss constant of 15 meters (49 feet).

Instantaneous injury. The FHWA estimates that the single strike peak pressure will be 203 dB. NMFS estimates that the single strike SEL will be 178 dB, and the single strike root mean square pressure will be 190 dB. NMFS assumes a high likelihood of injury to salmonids from instantaneous pulses of single strike peak SPLs above 206 dB, which is greater than the estimated peak SPL of 203 dB. Therefore, the proposed action is not expected to result in instantaneous injury to salmon or steelhead.

Cumulative strike effects. Installation of all in-water piles is expected to take up to 97 days (50 days for new bridge work trestle in year 1 and 47 days for pedestrian bridge work trestle in year 2) with up to 100 strikes per pile or up to 400 strikes per day with the impact hammer for proofing 24-inch steel piles. The model used by NMFS assumes that cumulative effects reset overnight based on assumed fish movement, so only strikes in a single day count toward cumulative impacts. Based on the proposed action, the Project may result in a cumulative SPL of 204 dB. Injury to salmonids from cumulative strikes is possible above 187 dB for salmonids weighing greater than 2 grams and above 183 dB for salmonids weighing 2 grams or less. Upper Columbia River spring-run Chinook salmon and UCR steelhead under 2 grams are not expected to be present in the action area during the in-water work period. Based on the NMFS hydraulic calculator, cumulative SELs will attenuate to below 187 dB within 447 feet of piles being proofed. Any individual adult and juvenile salmon and steelhead that do not flee and remain within 447 feet in any direction of impact hammer proofing of 24-inch piles in the Wenatchee River could be injured or killed by the cumulative effects of repeated pile strikes. Because of the elevated daytime summer temperatures in the immediate Project area (i.e., location of pile installation), we do not expect adult spring-run Chinook salmon or steelhead to occur within the cumulative impact zone or even near this zone during the daylight hours. We do expect that individual adults would pass through the immediate project area at night when temperatures moderate and there is no Project work occurring. Additionally, we anticipate only a few juvenile spring-run Chinook salmon and steelhead to be present within the cumulative impact zone. This is because nearly all, if not all, outmigrating smolts will have moved through the area prior to the in-water work period, and because the Project area is not suitable for juvenile rearing during the in-water work period. Therefore, we expect a very small number of juvenile Wenatchee River spring-run Chinook salmon and summer steelhead within 447 feet of piles being proofed with an impact hammer will experience SPLs that will injure or kill them from the cumulative pile strikes of 24-inch steel piles on 97 separate days.

Behavioral effects. Behavioral modifications of adult and juvenile UCR spring-run Chinook salmon and UCR steelhead are expected to occur for up to 97 days total (over the course of 1 to 2 years) within 2,500 feet upstream to the first bend in the Wenatchee River and about 5,500 feet downstream to the Columbia River's left bank. This range distance takes in the Wenatchee River–Columbia River confluence and the Columbia River to the opposite shore of the Wenatchee River's mouth. We expect varying levels of

behavioral responses from adult and juvenile salmon and steelhead exposed to SPLs above 150 dB. These responses range from no change, to mild awareness, to a startle response (Hastings and Popper 2005). We expect a small number of adults and juveniles will flee the action area for the duration of impact pile driving activity. These fish are expected to move short and long distances or seek cover by moving either upstream or downstream in the Columbia River. Displacement within the Columbia River may experience increased exposure to predation (larger fish and birds) from avoiding elevated SPLs for up to 50 days. Therefore, we expect a very small number of adult and juvenile Wenatchee River spring-run Chinook salmon and summer steelhead will modify their behavior within 2,500 feet upstream and 5,500 feet downstream of the 24-inch piles being proofed with an impact hammer for 97 days. Some of these juveniles may experience an increased risk of predation.

Vibrations and Sound from Bridge Work and Traffic

Vehicles traveling on bridges with in-water piers result in vibration of underwater substrates. Salmon and steelhead can detect low frequency particle motion and substrate vibration and sounds emanating from the substrate (Reeder et al. 2020). The added sounds in the aquatic environment may have a wide range of effects on fishes. The added sounds may affect their behavior, causing them to move away from their migration routes, leave favored habitats in which they feed or breed, interfere with communication using sound, or prevent the detection of other biologically important sounds. Anthropogenic vibrations may also produce stress responses (Popper et al. 2019). Consequently, the addition of anthropogenic sounds to the aquatic environment has the potential to harm salmon and steelhead. These effects are already occurring due to the existing BNSF railroad bridge that lies approximately 100 feet upstream of the new bridge location and the SR 285 bridge (N. Wenatchee Avenue), located about 900 feet upstream of the Project area. The new bridge will result in additional vehicles crossing the Wenatchee River. Therefore, we expect daily sounds and vibrations to moderately increase from the new bridge crossing. This can result in a startle response in juvenile and adult salmon and steelhead that migrate through the Project area and can alter normal rearing and feeding behavior in overwintering juvenile spring-run Chinook salmon, potentially increasing the risk of predation for some of the juveniles. Therefore, we expect additional vehicles crossing the Wenatchee River to create a startle response in several juvenile and adult salmon and steelhead while migrating or rearing. This will temporarily alter normal rearing and migration behavior and may increase the risk of predation for a small number of juveniles when they are using the area.

Summary on Effects on Species

We expect a very small number of juvenile UCR steelhead and UCR spring-run Chinook salmon to be injured or killed by fish salvage operations in 1,200 square feet.

Pulses of suspended sediment and turbidity associated with pile installation and removal will cause short term (lasting a few minutes to about half an hour) behavioral changes of a few Wenatchee River spring-run Chinook salmon and Wenatchee River summer steelhead within 300 feet of turbidity generating activities, displacing them from preferred rearing habitat and increasing their risk of predation and mortality. We do not expect any fish to be injured or killed

by exposure to accidental releases of fuel, oil, and other contaminants caused by this action, nor do we expect stormwater to degrade water quality such that it impacts salmon or steelhead during or after project construction.

We do not anticipate that up to 16,800 square feet of shading from the Project structures will alter juvenile salmon migration or rearing behavior, or measurably increase risk from predation. Adults only migrate through the action area and we do expect migration behavior to be altered by Project shading.

The permanent loss of 0.24 acres of riparian habitat within the first 100 feet of the shorelines will not appreciably reduce near shore shading or prey production. Therefore, we do not anticipate any adverse effects to salmon or steelhead from this permanent loss of habitat.

Neither vibratory nor impact pile driving is expected to result in instantaneous injury or mortality to salmon or steelhead. Underwater sounds from pile proofing with an impact hammer will reach the Columbia River and may temporarily alter normal migration and rearing behavior as fish move to avoid the noise. We do not believe that vibratory driving will result in behavioral effects to adult or juvenile salmon or steelhead. We expect a very small number of juvenile Wenatchee River spring-run Chinook salmon and summer steelhead within 447 feet of piles being proofed with an impact hammer will experience SPLs that will injure or kill them from the cumulative pile strikes of 24-inch steel piles on 97 separate days. We also expect a very small number of adult and juvenile Wenatchee River spring-run Chinook salmon and summer steelhead will modify their behavior within 7,068 feet of 24-inch piles being proofed with an impact hammer for 97 days, and some of these juveniles will experience an increased risk of predation

Lastly, the new bridge will add additional traffic over the Wenatchee River, resulting in substrate vibrations and sounds that will create a startle response in several juvenile and adult salmon and steelhead while migrating or rearing. This will temporarily alter normal rearing and migration behavior and may increase the risk of predation for a small number of juveniles when they are using the area.

2.5.2. Effects on Critical Habitat

Critical habitat for UCR spring-run Chinook salmon and UCR steelhead salmon is designated in the action area. The action area includes PBFs for freshwater migration and rearing. The essential features in the action area for these two types of PBFs that will be affected by the proposed action include water quality and natural cover/riparian vegetation. The effects of the proposed action on these features are summarized below.

Water Quality

Water quality will be temporarily reduced within the project area during two or three in-water work periods (July 15–September 30). The proposed action is expected to increase delivery of suspended sediment intermittently and temporarily to the waterway during installation and removal of piers, piles, casings, sheet pile, and silt curtains or other silt containment equipment.

Because erosion control measures and BMPs will be implemented during construction, very little sediment is expected to be released from the project site. Localized resuspension of sediment will occur during pile driving and removal and installation of silt containment materials (sediment curtains and coffer dams). The temporary pulses (minutes to a few hours) of increased turbidity and suspended sediment may move up to 300 feet downstream of the in-water work area. We also expect minor leaks and spills of petroleum-based fluids (not more than ounces) that will be contained on site in secondary containment basins. Therefore, overall, NMFS expects small, temporary, and intermittent, negative effects to water quality at the scale of the action area during two or three in-water construction periods.

Stormwater

During project construction, stormwater will be managed according to the *Washington State Department of Ecology 2019 Stormwater Management Manual for Eastern Washington*. This will include using sediment ponds, drainage swales, sediment fences, grading, and stabilizing disturbed soil surfaces. New stormwater treatment facilities will be installed and connected to existing outlets. Therefore, we do not expect stormwater during or after project construction to degrade water quality at the scale of the action area.

Riparian Vegetation

A total of 0.91 acres of vegetation (both shorelines combined) will be removed from within the 200-foot riparian zone and approximately 1.05 acres will be replanted with native species within the 200-foot zone. A total of 0.24 acres will be permanently lost within the first 100 feet of the shorelines in the Project area. This will result in a minor loss of near shore shading and prey production (forage); however, we do not expect the small reduction in stream shade to reduce water quality or the water quality PBF (e.g., increase summer stream temperature) at the scale of the action area. The addition of the new bridge will offset any increases of stream shade. We also do not expect the minor loss of forage to affect the forage PBF at the scale of the action area.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline versus cumulative effects. 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 presence and continued use of the existing BNSF railroad bridge, SR 285 bridge, and the new bridge, along with resource-based activities such as timber harvest, agriculture, and irrigation withdrawals are likely to continue to exert an influence on the quality of freshwater habitat in the action area. Additional effects to ESA-listed salmonid and steelhead are anticipated with population growth and urban development. NMFS assumes the population of Chelan County will continue to grow for the foreseeable future.

NMFS is not aware of any specific future non-Federal activities within the action area that would cause greater effects to a listed species or designated critical habitat than presently occur. Therefore, 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

Upper Columbia River spring-run Chinook salmon from the Wenatchee River spring-run population and UCR steelhead from the Wenatchee River population inhabit the action area and depend on it to support adult and juvenile migration and juvenile winter rearing. Both the UCR spring-run Chinook salmon Wenatchee population and steelhead Wenatchee population remain at high overall risk driven by low abundance and productivity relative to viability objectives and diversity concerns. For the UCR spring-run Chinook salmon ESU to achieve recovery, all spring-run Chinook salmon populations within the ESU, including the Wenatchee River spring-run population, need to improve and meet abundance/productivity criteria that represent a 5 percent extinction risk over a 100-year period as the recovery scenario. For the UCR steelhead DPS to achieve recovery, the Wenatchee River, Entiat River, Methow River, and Okanogan River populations must improve and meet abundance/productivity criteria that represent a 5 percent extinction risk over a 100-year period.

As described in Section 2.5.1, the proposed action will have effects on adult and juvenile UCR spring-run Chinook salmon and UCR steelhead for 2 or 3 years during the in-water work period.

The proposed action will also have effects on adults and juveniles from increased traffic over the Wenatchee River for many years.

The primary impact during project construction will be altered migration and rearing behavior in the Columbia River due to in-water noise from pile installation and removal in the Wenatchee River. Very few, if any, individual adult and juvenile Chinook and steelhead are expected to be in the immediate Project area because high daytime temperatures (at or above 20°C) will likely preclude their presence. Stream temperatures normally drop by 3.5°C to 4.5°C during the nighttime hours when no in-water work will occur. This will allow adult Chinook and steelhead migrating to the upper Wenatchee Basin to move through the Project area. Furthermore, there would be no degradation of water quality during the nighttime hours as there will be no construction activities.

Neither vibratory nor impact pile driving is expected to result in instantaneous injury or mortality to salmon or steelhead. This is largely due to the in-water construction activities occurring when elevated daytime stream temperatures (at or above 20°C) preclude the presence of both adult and juvenile UCR spring-run Chinook salmon and UCR steelhead in the Wenatchee River. Adult UCR spring-run Chinook salmon and UCR steelhead and some juveniles of these species will be present in the Columbia River near the mouth of the Wenatchee River during the in-water work period. Underwater sounds from pile driving will reach the Columbia River and may temporarily alter normal migration and rearing behavior as fish move to avoid the noise. We do not believe that vibratory driving will result in immediate direct injury or death to juvenile or adult salmon or steelhead, nor will it affect juvenile behavior. Therefore, we expect a very small number of juvenile Wenatchee River spring-run Chinook salmon and summer steelhead within 447 feet of piles being proofed with an impact hammer will experience SPLs that will injure or kill them from the cumulative pile strikes of 24-inch steel piles on 97 separate days. We also expect a very small number of juvenile Wenatchee River spring-run Chinook salmon and summer steelhead will experience increased risk of predation from avoiding elevated SPLs for up to 97 days total over the course of 1 to 2 years.

Releases of suspended sediment and elevated turbidity levels from pile placement and extraction will cause short-lived (minutes to half an hour) behavioral changes in adults and juveniles within 300 feet of the turbidity generating activity, which will increase the risk of predation of juveniles.

While we expect that very few, if any, juvenile Chinook and steelhead will need to be recovered from within the steel casing coffer dams (because they are unlikely to be present during installation), fish salvage could result in injury or mortality to a very small number of juvenile Chinook salmon and steelhead.

Overwater shading of roughly a 16,800-square-foot area will also result from the new bridge and temporary work trestles. However, the reach of the Wenatchee River where the new bridge and work trestles will be located is swift flowing water, lacking the habitat complexity and space for predators to hold and prey on juvenile salmon in the action area. Therefore, we do not anticipate that shading from the Project structures will alter juvenile salmon migration or rearing behavior, or measurably increase risk from predation. Adults only migrate through the action area and we

do expect migration behavior to be altered by Project shading. However, we expect that increased traffic associated with the bridge will produce substrate vibrations and sounds that will create a startle response in several juvenile and adult salmon and steelhead while migrating or rearing. This will temporarily alter normal rearing and migration behavior and may increase the risk of predation for a small number of juveniles when they are using the area.

Injury and mortality may occur from predation by piscivorous birds that take advantage of the new bridge for perching. We cannot reasonably predict how many birds will use the bridge to initiate predation on juvenile salmon and steelhead, but we expect it to be very small as foot, bicycle, and vehicle traffic will frequently startle birds away from the bridge and significantly reduce their opportunity to launch attacks on juvenile fish from the bridge.

These effects and reductions are not expected to appreciably alter the abundance, productivity, spatial structure, or diversity of the Wenatchee River UCR spring-run Chinook salmon or UCR steelhead populations. 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 the species, the effects of the action will not cause reductions in reproduction, numbers, or distribution that would reasonably be expected, directly or indirectly, to noticeably reduce the likelihood of both the survival and recovery of UCR spring-run Chinook salmon and UCR steelhead.

2.7.2. Critical Habitat

Critical habitat in the action area is degraded due to transportation infrastructure, water diversions, agriculture, urban development, riparian vegetation management, and the Rock Island Development. 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 features. 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. The riparian system provides inadequate protection of habitats and refugia for sensitive aquatic species. 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 UCR spring-run Chinook salmon and UCR steelhead. The proposed action will have small, temporary, and intermittent negative effects to water quality (turbidity, sediment, chemical contaminations) at the scale of the action area for two to three in-water work

periods (July 15–September 30). Increases in total suspended solids and turbidity during in-water construction are expected to occur intermittently, be small, extend no more than 300 feet downstream, and persist for minutes to a few hours. Minor leaks and spills of petroleum-based fluids (not more than ounces) will be contained in secondary containment basins.

Based on our analysis that considers the current status of PBFs, adverse effects from the proposed action will cause a small and localized decline in the quality and function of PBFs in the action area over 2 to 3 years. However, because of the scale and extent of the effects to PBFs, we do not expect a reduction in the conservation value of critical habitat in the action area. As we scale up from the action area to the designation of critical for each species, the proposed action is not expected to appreciably reduce the conservation value of the designated critical habitat.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and 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 or UCR steelhead.

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 adult and juvenile salmon and steelhead is reasonably certain to occur and will include harm and harassment as follows: (1) behavioral changes due to temporary increases in turbidity, which will increase risk of predation to juveniles; (2) behavioral changes, injury, and death from hydroacoustic disturbance generated from impact pile-driving activities; (3) behavioral changes due to substrate vibrations and sounds from increased traffic over the Wenatchee River that will alter normal rearing and migration behavior and may increase the risk of predation for juveniles when they are using the

area; and (4) injury and death from fish salvage. NMFS is reasonably certain the incidental take described here will occur because: (1) ESA-listed species are known to occur in the action area; and (2) the proposed action includes in-water activities that can harm or kill juvenile salmon and steelhead.

Incidental Take from Increased Turbidity and Disturbance

Take in the form of harm caused by the temporary increases in turbidity will be manifested in altered behaviors including avoidance of the area, abandonment of cover, and exposure to predators. We expect turbidity plumes to extend no further than 300 feet and persist for no more than minutes to half an hour. It is not possible to determine the number of fish killed by the turbidity plumes. Therefore, NMFS uses a surrogate for incidental take caused by the turbidity. The surrogate is the areal extent of the turbidity plume. The surrogate is causally linked to the take pathways the scale of the effect is related to the size of the turbidity plume. Thus, the extent of take will be exceeded if turbidity plumes exceed 300 feet below the work area.

Incidental Take from Hydroacoustic Sound Pressure Levels during Pile-Driving

NMFS expects harm (injury and death) and harassment (altered behavior) of adult and juvenile UCR spring-run Chinook salmon and UCR steelhead by exposure to hydroacoustic cumulative SPLs during impact pile-driving activities. It is not possible to determine the number of fish that will be harmed or harassed by impact pile driving from repeated pile strikes. Therefore, NMFS uses a surrogate for incidental take. The surrogate is causally linked to the take pathways because the risk of injury and severity of injury from sound pressure waves increase with additional pile strikes, and more fish are exposed to possible injury when the time period of pile driving is longer.

The best available indicator to measure the extent of incidental take caused by pile driving is cumulative SELs exceeding 187 dB within a 447-foot radius from each pile where an impact hammer is used. The extent of take will be exceeded if cumulative SELs greater than 187 dB occur beyond 447 feet in any direction from any single pile being driven or proofed with an impact hammer.

Incidental Take from Fish Salvage

The fish salvage is included in this Project to avoid or minimize injury or death to fish due to dewatering. We do not expect adult fish to be in the primary work area during cofferdam placement and dewatering. Additionally, we expect that few juvenile spring-run Chinook salmon or steelhead will be present. The absence of adult and juvenile fish would be mainly due to the lack of adult holding and juvenile rearing habitat, shallow and swift water, and elevated water temperatures. Fish salvage will be carried out by a qualified fish biologist and performed according to WSDOT Fish Exclusion Protocols and Standards (WSDOT 2016). However, individual fish that are present and trapped inside the cofferdams may experience stress, injury, or mortality from salvage operations. We expect a very small number of juvenile UCR steelhead and UCR spring-run Chinook salmon to be injured or killed by fish salvage operations.

Therefore, the extent of take will be exceeded if more than four (4) spring-run Chinook salmon or steelhead (four total between the two species) are killed from fish salvage operations.

If at any time the level or method of take exempted from take prohibitions and quantified in this opinion is exceeded, reinitiation of consultation may be required.

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 UCR spring-run Chinook salmon or UCR steelhead, 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 FHWA shall:

1. Avoid or minimize take from sound pressure waves.
2. Avoid or minimize take from reduced water quality.
3. Avoid or minimize take from increased predation.
4. Track, monitor, and report on the project to ensure that the project is implemented as proposed and the amount and extent of take is not exceeded.

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The FHWA or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement RPM 1:
    a. Only use an impact hammer to proof piles when necessary.
    b. When possible, place a cushion block between the hammer and pile.
    c. Ensure the bubble curtain distributes air bubbles around 100 percent of the perimeter of the piles over the full depth of the water column.
    d. Perform monitoring of impact pile driving to identify:
        i. Sound pressure levels through hydroacoustic monitoring during use of an impact hammer.
        ii. Any observations of fish in distress or killed during the activity.
        iii. Dates of initiation and completion of impact pile driving.

2. The following terms and conditions implement RPM 2:
    a. Conduct turbidity monitoring as follows:
        i. Monitoring will be conducted daily, every 4 hours during daylight hours, 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 upstream of the action area.
        iii. Measure or observe background turbidity levels at an undisturbed site within the flow channel approximately 100 feet upstream of the project area.
        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.
    b. A chemical and pollution control plan will be prepared and carried out, commensurate with the scope of the project, which includes:
        i. The name, phone number, and address of the person responsible for accomplishing the plan.
        ii. Best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, petroleum product, or other hazardous materials generated, used, or stored on-site including notification of proper authorities.

3. The following terms and conditions implement RPM 3:
    a. Install pile caps or other avian deterrent measures on piles.

4. The following terms and conditions implement RPM 4:
    a. Track and monitor construction activities to ensure that the conservation measures are meeting the objective of minimizing take.
    b. Submit a completion of project report to NMFS two months after project completion. The completion report shall include, at a minimum, the following:
        i. Starting and ending dates for work completed, with in-water work period specified.
        ii. Summary and details of turbidity monitoring.
        iii. Methods used to contain sediment, erosion and turbidity.
        iv. Any daily observed sediment plume from the in-channel work area to 300 feet downstream during the in-water construction period.
        v. A summary of pollution and erosion control inspection results, including results of implementing required BMPs, including a description of any

erosion control failure, contaminant release, and efforts to correct such incidences.

vi. Total amount and area of vegetation removal.

vii. Number and species of fish observed injured or killed in the Wenatchee and Columbia Rivers.

c. Reference consultation number WCRO-2022-00921 in all reports and send to: crbo.consultationrequest.wcr@noaa.gov.

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

2.10. Reinitiation of Consultation

This concludes formal consultation for the Confluence Parkway 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 FHWA 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 riparian habitat.

The proposed project does include installation and removal of 385, 24-inch-diameter steel piles; installation of three, 10-foot-diameter steel casings; installation and removal of three, 14-foot-diameter steel casings; and installation and removal of three, 20-foot-by-20-foot steel sheet pile. The proposed project includes disturbance of channel substrate, pile-driving, and installation of three new permanent bridge piers. This action will also result in increased turbidity resulting in short-term and long-term effects to water quality and feeding habitat.

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.

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 conservation recommendation:

1. Implement RPM 1 and RPM 2, and their terms and conditions described in the ITS in the ESA portion of this document, to minimize adverse effects to EFH due to operation of heavy equipment, in-water construction, and sediment disturbance.
2. Implement RPM 4, and its terms and conditions described in the ITS in the ESA portion of this document, to ensure completion of monitoring and reporting to confirm that these terms and conditions are effective for avoiding and minimizing adverse effects to EFH.

Fully implementing this EFH conservation recommendation would protect, 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 FHWA 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 FHWA 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 FHWA. Other interested users include the Yakama Indian Nation, Confederated Tribes of the Colville Reservation, Chelan County PUD, and the city of Wenatchee. Individual copies of this opinion were provided to the FHWA. The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). The format and naming adhere to conventional standards for style.

4.2. Integrity

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

4.3. Objectivity

Information Product Category: Natural Resource Plan

***Standards*:** This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including 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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