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-2021-00328
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June 23, 2021

Michelle Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, WA 98124-3755

Re: Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Schlagel Park Boat Launch Project, Franklin County, Washington

Dear Ms. Walker:

Thank you for your letter dated February 18, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (U.S.C. 1531 et seq.) for the Schlagel Park Boat Launch. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

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. However, after reviewing the proposed action, we concluded that there are no adverse effects on EFH. Therefore, we are hereby concluding EFH consultation.

In this biological opinion (opinion), NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of ESA-listed Upper Columbia River (UCR) spring-run Chinook (*Oncorhynchus tshawytscha*), UCR steelhead (*O. mykiss*), or Middle Columbia River steelhead. NMFS also determined that the action will not destroy or adversely modify designated critical habitats for these species. Rationale for our conclusions is provided in the attached opinion.

As required by Section 7 of the ESA, NMFS provided an incidental take statement (ITS) with the opinion. The ITS describes reasonable and prudent measures (RPMs) NMFS considers necessary or appropriate to minimize incidental take associated with these actions. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the Federal agency and any person who performs the action must comply with to carry out the RPMs.

Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

Please contact Sean Gross of the Columbia Basin Branch at (509) 962-8911 x806 or electronic mail at sean.gross@noaa.gov, if you have any questions concerning this consultation or if you require additional information.

Sincerely,

Michael P. Tehan
Assistant Regional Administrator
Interior Columbia Basin Area Office
NOAA Fisheries, West Coast Region

cc: David Moore, U.S. Army Corps of Engineers
Kristen Currens, MacKay Sposito
Katherine Sarensen, U.S. Fish and Wildlife

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

Schlagel Park Boat Launch
NMFS Consultation Number: WCRO-2021-00328

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

Affected Species and 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 spring-run Chinook salmon	Endangered	Yes	No	Yes	No
Upper Columbia River steelhead	Threatened	Yes	No	Yes	No
Middle Columbia River steelhead	Threatened	Yes	No	Yes	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast salmon	No	N/A

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

Issued By:

Michael P. Tehan
Assistant Regional Administrator

Date: June 23, 2021

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ACRONYM GLOSSARY

ADA	Americans with Disabilities Act
BA	Biological Assessment
CFR	Code of Federal Regulations
CHART	Critical Habitat Analytical Review Team
City	City of Pasco
Corps	U.S. Army Corps of Engineers
dB	Decibels
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FHWG	Fisheries Hydroacoustic Working Group
FR	Federal Register
ICRD	Interior Columbia Recovery Domain
ICTRT	Interior Columbia Basin Technical Recovery Team
ITS	Incidental Take Statement
MCR	Middle Columbia River
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NWFSC	Northwest Fisheries Science Center
OHWM	Ordinary High Water Mark
opinion	Biological Opinion
PAH	Polycyclic Aromatic Hydrocarbon
PBF	Physical and Biological Feature
PCE	Primary Constituent Element
Project	Schlagel Park Boat Launch Project, Franklin County, Washington
RMS	Root Mean Square
RPM	Reasonable and Prudent Measure
SEL	Sound Exposure Level
SPL	Sound Pressure Level
U.S.C.	United States Code
UCR	Upper Columbia River
USFWS	U.S. Fish and Wildlife Service
VSP	Viable Salmonid Population
WDFW	Washington State Department of Fish and Wildlife

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.), and its implementing regulations at 50 CFR 402, as amended.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov). A complete record of this consultation is on file at the Columbia Basin Branch field office in Ellensburg, Washington.

1.2 Consultation History

The following chronology documents key points of the consultation process that culminated in this opinion for NMFS' listed species:

On October, 1, 2020, a meeting was held between the applicant and NMFS, the U.S. Fish and Wildlife Service (USFWS), and the Washington State Department of Fish and Wildlife (WDFW) to discuss the Schlagel Park Boat Launch project (project) and regulatory requirements.

On February 18, 2021, NMFS received a letter requesting formal consultation along with a biological assessment (BA) from the U.S. Army Corps of Engineers (Corps). The Corps concluded that the proposed action is likely to adversely affect Upper Columbia River (UCR) spring-run Chinook salmon (*Oncorhynchus tshawytscha*), UCR steelhead (*O. mykiss*), Middle Columbia River (MCR) steelhead, and their critical habitat. The Corps also concluded that essential fish habitat (EFH) for Chinook salmon and coho salmon, as designated by section 305 of the Magnuson–Stevens Fishery Conservation and Management Act, may be adversely affected. However, after reviewing the proposed action, we concluded that there are no adverse effects on EFH. NMFS consultation request was assigned tracking number WCRO-2021-00328 and consultation initiated on February 18, 2021.

1.3 Proposed 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 (50 CFR 402.02).

The Corps proposes to authorize the City of Pasco (City) to make improvements to facilities at Schlagel Park per sections 404 and 408 of the Clean Water Act. The Park is owned by the Corps and managed by the City. The purpose of the project is to improve the safety of the facilities and meet standards for access consistent with the Americans with Disabilities Act (ADA).

The project includes upland improvements including restroom, parking, and lighting upgrades, as well as in-water improvements. Upland improvements include facilities that will direct stormwater to bioinfiltration swales to reduce runoff from the parking area that currently enters the river.

Proposed in-water improvements include replacement of the float and deteriorating boat ramp with new structures that meet modern safety standards for public facilities. One lane of the existing ramp has been closed because the concrete is deteriorating from traffic use. The existing 5,175-square-foot boat ramp and 400-square-foot access float will be replaced with a new 3,128-square-foot ramp and 480-square-foot access float. Up to four 16-inch diameter piles will be driven to anchor the new access float, replacing the three piles that anchor the existing float.

In-water work will commence with installation of a turbidity curtain and herding fish out of the area being enclosed. The existing concrete ramp within the turbidity curtain will be removed by an excavator and hauled offsite. The float and steel decking will be removed by an excavator or by a barge-mounted crane and disposed offsite. All three existing piles will be removed by crane or vibratory hammer.

A new, smaller, ramp will be constructed by installing geotextile fabric, then crushed rock subgrade, then precast concrete panels. Riprap will be installed at the edge of the concrete to protect the concrete from scour.

The new float will consist of four 6-foot by 20-foot sections. The float will be composed of fiberglass decking with 60 percent open area. The net open area for the floats will be at least 15 percent. The float will be supported by four, 16-inch steel piles. The piles will be installed with a vibratory hammer if possible, though an air impact hammer may be required for part of the installation such that up to 800 impact pile strikes may be performed. If an impact hammer is used, a bubble curtain and wood block will be used to reduce the impact of sound pressure waves, and all impact strikes will be confined to 1 day of construction.

In-water work will occur between November 1 and February 28.

As a consequence of the proposed action, the City will re-open the south lane of the boat ramp, which may cause some boat launching activity at other nearby facilities to be rerouted to the Schlagel Park launch because wait times to launch will be reduced. The City expects that this would lead to a minor change in boat traffic patterns in the area, and not increase overall boating activity.

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

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and 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 CFR402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition 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:

1. Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
2. Evaluate the environmental baseline of the species and critical habitat.
3. Evaluate the effects of the proposed action on species and their habitat using an exposure–response approach.
4. Evaluate cumulative effects.
5. 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.

6. If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

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

2.2.1 Status of the Species

For Pacific salmon, steelhead, and other relevant species, NMFS commonly uses four parameters to assess the viability of the populations that, together, constitute the species: spatial structure, diversity, abundance, and productivity (McElhany et al. 2000). These "viable salmonid population" (VSP) criteria therefore 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. These attributes are influenced by survival, behavior, and experiences throughout a species' entire life cycle, and these characteristics, in turn, are influenced by habitat and other environmental conditions.

"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 fundamentally 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 at 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, NMFS assesses 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).

The summaries that follow describe the status of the ESA-listed species and their designated critical habitats that 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) and in the most recent 5-year status reviews, as well as applicable recovery plans.

Table 1. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this consultation. Listing status: ‘T’ means listed as threatened; ‘E’ means listed as endangered.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Upper Columbia River spring-run	E 6/28/05; 70 FR 37160	9/02/05; 70 FR 52630	ESA section 9 applies
Steelhead (*O. mykiss*)			
Middle Columbia River	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
Upper Columbia River	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	2/01/06; 71 FR 5178

Upper Columbia Spring-run Chinook Salmon

On March 24, 1999, NMFS listed UCR spring-run Chinook salmon as an endangered species (64 FR 14308) and their endangered status was reaffirmed on May 26, 2016 (81 FR 33468). The evolutionarily significant unit (ESU) includes all naturally-spawned 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). Three populations of UCR spring-run Chinook salmon are included in this ESU: The Wenatchee, Entiat, and Methow. 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).

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. The integrated spatial structure and diversity risk ratings for all three populations in this ESU are at "high" risk, per NMFS' last status review update (NMFS 2016b). The spatial processes component is "low" risk for the Wenatchee River and Methow River populations and "moderate" risk for the Entiat River (loss of production in the lower section increases effective distance to other populations). All three of the populations in this ESU are at "high" risk for diversity, driven primarily by chronically high proportions of hatchery-origin spawners of 26 to 76 percent in natural spawning areas and lack of genetic diversity among the natural-origin spawners (Ford 2011; NMFS 2014; NWFSC 2015). This effect is particularly high in the Wenatchee and Methow populations with hatchery spawners composing 66 percent and 76 percent respectively (NMFS 2014). The high proportion of hatchery spawners reflects the large increase in releases from the directed supplementation programs in those two drainages. The hatchery supplementation program in the Entiat was discontinued in 2007 and hatchery fish on the spawning grounds in the Entiat have declined in recent years.

Abundance and productivity. Both abundance and productivity characteristics remained at "high" risk for each of the three populations in this ESU, per NMFS' last status review update (NMFS 2016b). Since then, abundance of natural-origin spawners has declined in association with poor marine conditions (NMFS 2020). Productivity has likely declined as well, and will be fully evaluated in NMFS upcoming 5-year status review expected in 2021. This indicates that

UCR spring-run Chinook salmon populations are not replacing themselves. Increases in natural origin abundance relative to the extremely low spawning levels observed in the mid-1990s are encouraging; however, average productivity levels remain extremely low. Possible contributing factors include density dependent effects, differences in spawning distribution relative to habitat quality, and reduced fitness of hatchery-origin spawners. Overall, the combinations of current abundance and productivity for each population result in a "high" risk rating.

As of the last status review, the UCR spring-run Chinook salmon ESU was not currently meeting the viability criteria [adapted from the Interior Columbia Basin Technical Recovery Team (ICTRT)] in the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan, and remained at a high risk of extinction (NWFSC 2015; NMFS 2016b). Since then, abundance has declined (NMFS 2020). NMFS will evaluate the implications for viability risk of declining recent returns in the upcoming 5-year status review, expected in 2021. The status review will consider new information on population productivity, diversity, and spatial structure, as well as the updated estimates of abundance.

Middle Columbia River Steelhead

On March 25, 1999, NMFS listed the MCR steelhead distinct population segment (DPS) as a threatened species (64 FR 14517). The threatened status was reaffirmed on January 5, 2006 (71 FR 834). The most recent status review, in 2016, concluded the species should remain listed as a threatened species (81 FR 33468). Critical habitat for the DPS was designated on September 2, 2005 (70 FR 52630). The summary that follows describes the rangewide status of MCR steelhead. More information can be found in the recovery plan (NMFS 2009b) and the most recent status review for this species (NMFS 2016a).

The MCR steelhead DPS includes all naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and including the Yakima River. The DPS comprises 20 historical populations (three of which are extirpated) grouped into four major population groups (MPGs). It also includes steelhead from seven artificial propagation programs (71 FR 834). This DPS does not include steelhead in the upper Deschutes River basin, which are designated as part of an experimental population (79 FR 20802; 76 FR 28715).

Estimates of historical (pre-1960s) abundance indicate that the total historical run size for this DPS might have been in excess of 300,000. Total run sizes for the major steelhead stocks above Bonneville Dam were estimated in the early 1980s to be approximately 4,000 winter steelhead and 210,000 summer steelhead. Based on dam counts for this period, the MCR steelhead DPS represented the majority of this total run estimate, so the returns to this DPS were probably somewhat below 200,000 at that time. It was also estimated that 74 percent of the returns to this DPS were of hatchery origin at that time (61 FR 41541). NMFS continued to note concerns about declining abundance (including in the John Day River basin, the largest producer of natural-origin steelhead) (NMFS 1996). The destruction and modification of habitat, overutilization for recreational purposes, impacts of hydropower development and operation, and high percentages of hatchery fish spawning naturally were cited as factors for decline for MCR steelhead at the time of listing (71 FR 834).

Life history. The MCR steelhead DPS includes 16 summer-run populations and four winter-run populations. Summer steelhead enter freshwater between May and October and require several months to mature before spawning; winter steelhead enter freshwater between November and April and spawn shortly thereafter. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Summer steelhead usually spawn farther upstream than winter steelhead (NMFS 2009b). Steelhead may enter streams and arrive at spawning grounds weeks or months (and even up to a year) before they spawn. They are therefore vulnerable to disturbance and predation. They need cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity. Once in the river, steelhead apparently rarely eat and grow little, if at all (NMFS 2009b).

Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months before hatching. Young steelhead typically rear in streams for some time (generally 2 years) before migrating to the ocean. Some juveniles move downstream to rear in larger tributaries and mainstem rivers. Most fish in this DPS spend 1 to 2 years in saltwater before re-entering freshwater (NMFS 2009b). Steelhead are iteroparous, meaning they can spawn more than once. Repeat spawning for Columbia River basin steelhead ranges from reported rates of 2 to 4 percent above Dam (Busby et al. 1996) to 17 percent in the unimpounded tributaries below Bonneville Dam (at River Mile 146.1).

Spatial structure and diversity. All populations remain at low or moderate risk for spatial structure per the last status review (NMFS 2016a). Status indicators for population diversity had changed for some populations, although in most cases the changes were not sufficient to shift composite risk ratings for a particular population, and all populations but one (the Upper Yakima River population) were rated at low or moderate risk for combined spatial structure and diversity (NWFSC 2015; NMFS 2016a).

Abundance and productivity. The last status review (NMFS 2016a; NWFSC 2015) found that for almost all populations in this DPS, the most recent 5-year geomean for natural-origin abundance had increased relative to the previous 5-year review. Similarly, 15-year trends were positive for most populations in the DPS. Populations in all four of the MCR steelhead MPGs exhibited similar temporal patterns in brood year returns per spawner: return rates for brood years 1995 to 1999 generally exceeded replacement but were generally well below replacement for brood years 2001 to 2003. Brood year return rates reflect the combined impacts of year-to-year patterns in marine life history stages, upstream and downstream passage survival, and density-dependent effects resulting from capacity or survival limitations on tributary spawning or juvenile rearing habitats. However, more recent data indicates that abundance in most populations has declined since the last status review, likely due to poor marine conditions and possibly to increased predation by increased abundance of sea lions in the lower Columbia River (NMFS 2020).

As of the 2016 status review, most populations showed increases in estimates of productivity. All but two populations (the Westside Deschutes River and Touchet River populations) were considered at either low or moderate risk for abundance and productivity.

The most recent status review (NMFS 2016a; NWFSC 2015) concluded that the MCR steelhead DPS was at moderate risk and remained threatened. While there had been improvements in the extinction risk for some populations, and while several populations were considered viable, the MCR steelhead DPS as a whole was not meeting delisting criteria and most risk ratings remained unchanged from the previous review. Since then, abundance has declined for most populations (NMFS 2020). NMFS will evaluate the implications for viability risk of declining recent returns in the upcoming 5-year status review, expected in 2021. The status review will consider new information on population productivity, diversity, and spatial structure, as well as the updated estimates of abundance.

Upper Columbia River Steelhead

The UCR steelhead DPS was listed as endangered on August 18, 1997 (62 FR 43937), and their status was upgraded to threatened on January 5, 2006 (71 FR 834). The threatened status was reaffirmed on May 26, 2016 (81 FR 33468). 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). There are four populations of UCR steelhead included in this DPS: The Wenatchee, Entiat, Methow, and Okanogan. Five artificial propagation programs are 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).

The life-history pattern of steelhead in the Upper Columbia is complex (Peven et al. 1994). Adults return to the Columbia River in the late summer and early fall. Unlike spring-run Chinook salmon, most steelhead do not move up quickly to tributary spawning streams. A portion of the returning run overwinters in the mainstem reservoirs, passing over the UCR dams in April and May of the following year. Spawning occurs in the late spring. Juvenile steelhead generally spends 1 to 3 years rearing in freshwater before migrating to the ocean, but have been documented spending up to 7 years in freshwater before migrating. Most adult steelhead return to the Upper Columbia after 1 or 2 years at sea.

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).

Life history. The life-history pattern of steelhead in the UCR DPS is complex. Upper Columbia River steelhead exhibit a stream-type life history, with individuals exhibiting a yearling life-history strategy (NMFS 2016b). Adults return to the Columbia River in the late summer and early fall. Unlike spring-run Chinook 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. The integrated spatial structure and diversity risk ratings for all four populations of UCR steelhead are at "high" risk, per the last status review (NMFS 2016b). These ratings are largely driven by chronic high levels of hatchery spawners of 42 to 87 percent within natural spawning areas and lack of genetic diversity among the populations. The relative effectiveness of hatchery origin spawners and the long-term impact on productivity of high levels of hatchery contribution to natural spawning are key uncertainties for these populations (Ford 2011; NMFS 2014; NWFSC 2015).

Abundance and productivity. Both abundance and productivity characteristics remained at "high" risk for three of the four populations in this DPS, per the last status review (NMFS 2016b). More recent data indicates that abundance in most populations has declined since the last status review, likely due to poor marine conditions and possibly to increased predation by increased abundance of sea lions in the lower Columbia River (NMFS 2020). No populations are currently meeting their minimum abundance targets for recovery (NMFS 2020).

As of the last status review (NMFS 2016), productivity levels remain low, except for the Wenatchee population. The proportions of hatchery origin returns in natural spawning areas remain extremely high across the DPS, especially in the Methow and Okanogan river populations, 76 percent and 87 percent respectively (NMFS 2014; NWFSC 2015). From 2017 through 2019, adult wild steelhead returns sharply declined. Poor ocean conditions that included some of the highest temperatures recorded in the Pacific Ocean were a significant factor.

NMFS will evaluate the implications for viability risk of declining recent returns in the upcoming 5-year status review, expected in 2021. The status review will consider new information on population productivity, diversity, and spatial structure, as well as the updated estimates of abundance.

2.2.2 Status of Critical Habitat

In evaluating the condition of designated critical habitat, NMFS examines the condition and trends of PBFs that are essential to the conservation of the ESA-listed species because they

support one or more life stages of the species. Proper function of these PBFs is necessary to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and the growth and development of juvenile fish. Modification of PBFs may affect freshwater spawning, rearing or migration in the action area. Generally speaking, sites required to support one or more life stages of the ESA-listed species (i.e., sites for spawning, rearing, migration, and foraging) contain PBFs essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food) (Table 2).

The following table describes the PBFs of the habitat types within the full range of habitat designated as critical for the listed salmonid species. Many of the watersheds in the designated critical habitat are of high value for conservation, although habitat has been impaired across the designated area. The proposed action, however, affects freshwater habitats and not estuarine or marine habitats.

Table 2. Physical and biological features of critical habitat designated for ESA-listed species considered in this opinion and corresponding species life history events.

Physical and Biological Features		**Species Life History Event**
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and “reverse smoltification” Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Nearshore marine areas	Forage Free of artificial obstruction Natural cover Water quantity Water quality	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing
Offshore marine areas	Forage Water quality	Adult growth and sexual maturation Adult spawning migration Subadult rearing

The PBFs of freshwater spawning sites include sufficient water quality and quantity and substrates that support spawning, egg incubation, and larval development (Table 2). These features are essential to conservation because without them the species cannot successfully spawn and produce offspring.

The PBFs of freshwater migration corridors include areas free from obstruction and excessive predation with sufficient water quantity and quality, and natural cover, as described above, that supports juvenile and adult mobility and survival. These features are essential to conservation because they allow adult fish to swim upstream to reach spawning areas, and they allow larval fish to proceed downstream and reach the ocean.

The PBFs of freshwater rearing sites include sufficient water quantity and floodplain connectivity to form and maintain habitat conditions that support juvenile growth and mobility, sufficient water quality and forage to support juvenile development, and that provide sufficient natural cover as shade, submerged and overhanging large wood debris, log jams, beaver dam, or aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because, without them, juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (e.g., predator avoidance, competition) that help ensure their survival.

Interior Columbia Recovery Domain

Critical habitat has been designated in the Interior Columbia recovery domain (ICRD), which includes the UCR spring-run Chinook salmon, MCR steelhead, 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 (NMFS 2009a; Wissmar et al. 1994). Critical habitat throughout much of the ICRD has been degraded by 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. Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems for critical habitat in developed areas.

Migratory habitat quality in this area has been affected by the development and operation of the Columbia River System dams and reservoirs in the mainstem Columbia River, Bureau of Reclamation tributary projects, and privately-owned dams in the Snake and Upper Columbia River basins. For example, construction of Hells Canyon Dam eliminated access to several likely production areas in Oregon and Idaho, including the Burnt, Powder, Weiser, Payette, Malheur, Owyhee, and Boise river basins (Good et al. 2005), and Grand Coulee and Chief Joseph dams completely block anadromous fish passage on the upper mainstem Columbia River.

Hydroelectric development modified natural flow regimes, resulting in higher water temperatures, changes in fish community structure leading to increased rates of piscivorous and avian predation on juvenile salmon and steelhead, and delayed migration for both adult and juveniles. Physical features of dams such as turbines also kill migrating fish. In-river survival is inversely related to the number of hydropower projects encountered by emigrating juveniles. Similarly, development and operation of extensive irrigation systems and dams for water withdrawal and storage in tributaries have altered hydrological cycles.

Many stream reaches designated as critical habitat in the ICRD are over-allocated, with more allocated water rights than existing streamflow. Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence et al. 1996). Reduced tributary streamflow has been identified as a major limiting factor for all listed salmon and steelhead species in this recovery domain except Snake River fall-run Chinook salmon (NMFS 2007; NMFS 2011b).

The ICRD is a very large and diverse area. The Critical Habitat Analytical Review Team (CHART) determined that few watersheds with PBFs for salmon or steelhead are in good-to-excellent condition with no potential for improvement. Overall, most ICRD watersheds are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some or high potential for improvement.

Despite these degraded habitat conditions, the watersheds 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. The Columbia River corridor is ranked as high conservation value. The CHARTs noted that this corridor connects every watershed and population for all listed ESUs/DPSs with the ocean, and is used by rearing and migrating juveniles and migrating adults of every component population.

2.2.3 Climate Change

One factor affecting the rangewide status of salmon and steelhead and aquatic habitat is climate change. The U.S. Global Change Research Program (2018) reports average warming in the Pacific Northwest of about 1.3 degrees Fahrenheit (ºF) from 1895 to 2011, and projects an increase in average annual temperature of 3.3ºF to 9.7ºF by 2070 to 2099 (compared to the period 1970 to 1999), depending largely on total global emissions of heat-trapping gases (predictions based on a variety of emission scenarios including B1, RCP4.5, A1B, A2, A1FI, and RCP8.5 scenarios); the increases are projected to be largest in summer (Melillo et al. 2014; USGCRP 2018). The five warmest years in the 1880 to 2019 record have all occurred since 2015, while 9 of the 10 warmest years have occurred since 2005 (Lindsey and Dahlman 2020). Climate change has negative implications for designated critical habitats in the Pacific Northwest (Climate Impacts Group 2009; ISAB 2007; Scheuerell and Williams 2005; Zabel et al. 2006), characterized by the Independent Scientific Advisory Board as follows:

- Warmer air temperatures will result in diminished snowpack and a shift to more winter/spring rain and runoff, rather than snow that is stored until the spring/summer melt season.
- With a smaller snowpack, watershed runoff will decrease earlier in the season, resulting in lower stream flows in June through September. Peak river flows, and river flows in general, are likely to increase during the winter due to more precipitation falling as rain rather than snow.

- Water temperatures are expected to rise, especially during the summer months when lower stream flows co-occur with warmer air temperatures.

These changes will not be spatially homogeneous across the entire Pacific Northwest. Low-lying areas are likely to be more affected. Climate change may have long-term effects that include, but are not limited to, depletion of important cold-water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, earlier emergence of fry, and increased competition among species.

Climate change is predicted to cause a variety of impacts to Pacific salmon and their ecosystems (Crozier et al. 2008; Martins et al. 2012; Mote 2003; Wainwright and Weitkamp 2013). The complex life cycles of anadromous fishes, including salmon, rely on productive freshwater, estuarine, and marine habitats for growth and survival, making them particularly vulnerable to environmental variation. Ultimately, the effects of climate change on salmon and steelhead across the Pacific Northwest will be determined by the specific nature, level, and rate of change and the synergy among interconnected terrestrial/freshwater, estuarine, nearshore, and ocean environments.

The primary effects of climate change on Pacific Northwest salmon and steelhead are:

- Direct effects of increased water temperatures on fish physiology.
- Temperature-induced changes to stream flow patterns, which can block fish migration, trap fish in dewatered sections, dewater redds, introduce non-native fish, and degrade water quality.
- Alterations to freshwater, estuarine, and marine food webs that alter the availability and timing of food resources.
- Changes in estuarine and ocean productivity that affect the abundance and productivity of fish resources.

Climate change is expected to make recovery targets for salmon and steelhead populations more difficult to achieve. Climate change is expected to alter critical habitat by generally increasing temperature and peak flows and decreasing base flows. Although changes will not be spatially homogenous, effects of climate change are expected to decrease the capacity of critical habitat to support successful spawning, rearing, and migration. Habitat action can address the adverse impacts of climate change on salmon. Examples include restoring connections to historical floodplains and freshwater and estuarine habitats to provide fish refugia and areas to store excess floodwaters, protecting and restoring riparian vegetation to ameliorate stream temperature increases, and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al. 2007; ISAB 2007).

2.3 Action Area

“Action area” means all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this project is the

Columbia River within the Pasco Boat Basin. To determine the action area, we looked at the various pathways of effect as a consequence of the proposed action and determined that the largest extent of effects will be from sound pressure waves. Sound pressure waves resulting from pile driving and temporary changes in water quality will be confined to the boat basin.

The action area is used by juveniles of all ESA-listed fish covered in this opinion; adults are not expected to use the action area. The Columbia River, including the Pasco Boat Basin, is designated critical habitat for these species.

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 Pasco Boat Basin is an approximately 10-acre embayment of the Columbia River's McNary Pool with approximately 2,800 feet of shoreline (NMFS 2006) (Figure 1). The embayment is separated from the river by a narrow entrance between artificial levees. The basin is located along heavily developed shoreline that provides little riparian function, although some trees are present. The basin hosts five overwater structures including a covered marina. NMFS approximates the coverage of these structures at 44,240 square feet, or approximately 10 percent of the boat basin. The Schlagel Park handling float accounts for 400 square feet, less than 1 percent of the existing overwater structure in the area, or 0.09 percent of the surface area of the basin.

Figure 1. Pasco Boat Basin (the Action Area). The Schlagel Park boat launch and handling float are circled in red.

Much of the uplands surrounding the basin are parking lots and discharge untreated stormwater to the basin, degrading water quality via multiple pollutants including sediment, oil, polycyclic aromatic hydrocarbons (PAHs), heavy metals, etc. NMFS is unaware of data indicating the degree of impairment for water quality, although the relatively large amount of impervious surface compared to the boat basin and the apparent low flushing rate due to the narrow surface water connection to the river suggest that pollutant loads may be high relative to other shoreline areas along the Columbia River. Poor flushing combined with little riparian vegetation and the effect of the downstream McNary Dam, are expected to result in elevated temperatures within the basin from spring through fall.

The Schlagel Park launch consists of an existing two-lane, 65-foot-wide by 80-foot-long, poured concrete boat ramp with a 5-foot-wide by 80-foot-long grated handling float. The float is supported by two 12-inch steel piles and one 6-inch concrete pile. The south lane is currently closed to boat traffic due to unsafe conditions on the concrete ramp. The handling float, located between the two lanes, is not compliant with ADA requirements for public facilities. The park's upland facilities are heavily disturbed from pre-settlement conditions and are regularly maintained as park lawn except for a narrow strip of riparian vegetation adjacent to the Pasco Boat Basin.

NMFS does not have detailed fish use data from the action area, but based on similar areas in the Columbia and Snake Basins, expects that the basin is not used by steelhead or Chinook salmon adults. It is likely that small numbers of juvenile steelhead and Chinook salmon use the basin

during the winter, and somewhat greater numbers pause in the basin for short periods during spring outmigration.

The basin is very likely used by non-native predatory fish such as largemouth and smallmouth bass for spawning and rearing. Artificial features within the basin, including riprapped shores and extensive overwater and in-water structure, generally convey an advantage to ambush-style predators, such as bass. NMFS expects that this advantage increases the number of juvenile salmon and steelhead that are killed in the boat basin.

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. 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 50 CFR 402.17(a) and (b).

2.5.1 Effects on Species

Exposure

Adult salmon and steelhead are not expected to use the action area. The action area is likely used by rearing and smolting juvenile steelhead and salmon.

Millions of juvenile salmonids migrate through the Columbia and Snake River reservoirs each year. Juvenile steelhead generally migrate in the Columbia and Snake River reservoirs as yearlings, while Chinook salmon have at least two different life history strategies—a stream-type and ocean-type. The stream-type Chinook salmon generally migrate as yearling juvenile fish in the spring, while the ocean-type Chinook salmon migrate downstream through the action area as subyearling juvenile fish, generally leaving natal areas within days to weeks following their emergence from the gravel. Peak movement of juvenile salmonid outmigration does not overlap with in-water construction activities.

Subyearling Chinook salmon generally remain close to the water surface, favoring water column habitat less than 6 feet deep and where currents do not exceed 0.1 feet per second. They seek lower energy areas where waves and currents do not require them to expend considerable energy to remain in position while they consume invertebrates that live on or near the substrate. These areas typically have fine-grain substrates supporting benthic prey production. Subyearling Chinook salmon rear in the littoral zone from approximately March through June (Chapman 2007). As they grow, they increasingly use deeper water, though they continue to move into the shallows at night to rest on the bottom. As the subyearlings begin to move downstream, they continue to use the littoral zone for feeding and resting. Some subyearlings remain in mainstem habitat to overwinter and then migrate downstream as yearlings. These may be either ocean or stream type fish.

Spring-run Chinook salmon mainly use deeper water during their downstream migration, though some fish are found in the littoral zone (Dauble et al. 1989). Dauble et al. (1989) caught 52 percent of subyearling Chinook salmon and 7 percent of yearling Chinook salmon within 100 feet of shore in water 5.9 meters (19 feet) deep, or less. Additionally, the most abundant group in the littoral zone, subyearling Chinook salmon, is likely composed of both fall and spring (ocean and stream) type Chinook salmon. In most cases, these groups are visually indistinguishable.

Older juvenile salmon and steelhead (+1 age class) use a variety of habitats including nearshore, off-channel, mid-channel, and deep-water habitats. Dauble et al. (1989) observed that yearling Chinook salmon smolts were often abundant just after sunset in shallow nearshore areas (less than 30 cm deep) of low current velocity, while Beeman and Maule (2006) observed a difference in daytime swim depth between yearling steelhead and yearling Chinook salmon, with steelhead migrating at a mean depth of 6 feet and Chinook salmon migrating at a mean depth of 10 feet. A study by Timko et al. (2011) reported juvenile steelhead migrating in the top 5 to 15 feet of the water column in the Priest Rapids Project (upstream of the action area).

In addition, investigations in the Snake River Basin indicate that about half of the subyearling Chinook salmon observed in the Snake River are actually spring-run Chinook salmon (Marshall et al. 2000). Connor et al. (2001) found that some spring-run Chinook salmon migrated up to 500 miles downstream of their natal rearing areas, vastly expanding the amount of habitat available to these fish. They also found that many of these subyearling-type spring-run Chinook salmon dispersed into shoreline areas of the mainstem, presumably for foraging and rearing, a behavior far more typical of fall-run Chinook salmon. Bradford and Taylor (1997) reported similar results with subyearlings dispersing downstream from natal tributaries to mainstem habitats. This mostly occurred during the night with fish moving to the stream margins and nearshore areas during the day. Therefore, occasionally it is reasonable to expect subyearling spring-run Chinook salmon to use nearshore, mainstem habitats just as fall subyearlings do.

Based on the above-described life history behaviors of the listed species, the proposed action has the potential to affect juvenile UCR spring-run Chinook salmon, UCR steelhead, and MCR steelhead. In-water work, including all pile driving, will occur between November 1 and February 28. The majority of out-migrating juveniles will have passed through the action area prior to the in-water work window, but some juveniles are expected to overwinter in the action area and could thus also be exposed to project effects.

Effects During Construction

Construction activities that occur in-water may affect overwintering juveniles in the Pasco Boat Basin. We anticipate that juvenile salmon or steelhead will be effectively herded out of the construction area prior to construction, given that the relatively small area and simplified habitat will greatly increase the success of herding, and the boat ramp offers poor habitat, reducing the number of fish to be herded. This movement will temporarily displace these juvenile fish from the existing ramp area into nearby habitat that is generally of higher quality. Although herding is

a form of disturbance, herded fish are not expected to have an increased risk of injury, predation, slower growth, or other deleterious effects.

Water Quality

In-water construction activities will increase turbidity temporarily by resuspending river sediments during removal and replacement of the ramp and piles. Work on the ramp will occur within a turbidity curtain, which will effectively reduce the spread of turbid water into areas that may be occupied by fish. Removal of the three piles is expected to result in localized minor increases in turbidity. In sum, increases in turbidity in waters occupied by fish after herding and deployment of the turbidity curtain will be minor and temporary such that effects are not expected to cause harm or other adverse effects to listed fish.

Impairment of water quality may result from accidental releases of fuel, oil, and other contaminants that can injure or kill aquatic organisms. Such releases, while rare, are reasonably likely to occur from the use of heavy equipment. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain PAHs, which can kill salmon at high levels of exposure, and can cause sublethal, adverse effects at lower concentrations (Meador et al. 2006). When spills occur, we expect they will be small (several ounces). A spill prevention plan and appropriate spill materials will be kept on site during construction. In addition, all heavy machinery will be checked for leaks and all hydraulic fluid will be certified as non-toxic to aquatic organisms.

We anticipate that herding will effectively remove all fish from the area that will be most subject to spills or leaks.

We anticipate PAH releases of only very small quantities (ounces) are likely with each accidental release or spill, such that PAH levels within the turbidity curtain would be insufficient to cause injury; concentrations of PAHs outside the turbidity curtain will be far lower, and therefore injury to listed fish is very unlikely. Spills or releases larger than a few ounces are not reasonably certain to occur and are therefore not addressed in this consultation.

Sound Pressure Levels and Noise

Pile driving will create hydroacoustic disturbance to any ESA-listed fish present in the action area. Pile driving increases sound pressure levels (SPLs) and noise. The proposed action includes driving four piles. Vibratory pile driving is the preferred method; however, impact pile driving may be used. A wooden pile cushion block and bubble curtain will be used for all piles being impact driven. All pile driving will be completed between November 1 and February 28.

Fishes with swimbladders (including salmonids) are sensitive to underwater impulsive sounds (i.e., sounds with a sharp sound pressure peak occurring in a short interval of time). As a pressure wave passes through a fish, the swimbladder is rapidly compressed due to the high pressure, and then rapidly expanded as the “under pressure” component of the wave passes through the fish. The injuries caused by such pressure waves are known as barotraumas. They

include the hemorrhage and rupture of internal organs, damage to the auditory system, and death for individuals that are sufficiently close to the source (Abbott et al. 2002; Caltrans 2004). Death can occur instantaneously, within minutes after exposure, or several days later.

A multi-agency work group identified criteria to define SPLs where effects to fish are likely to occur from pile driving activities (FHWG 2008). These thresholds represent the initial onset of injury, and not the levels at which fish will be severely injured or killed. The most harmful level of effects is where a single strike is greater than 206 dB_{peak}[1] where direct injury or death of fish can occur. Besides peak levels, sound exposure levels (SEL) (the amount of energy dose the fish receive) can also injure fish. These criteria are either 187 dB_{SEL}[2] for fish larger than 2 grams (0.1 ounces) or 183 dB_{SEL} for fish smaller than 2 grams for cumulative strikes (NMFS 2008). In addition, any salmon or steelhead within a certain distance of the source [i.e., the radius where the root mean square (RMS) SPL will exceed 150 dB_{RMS}[3]] will be exposed to levels that change the fish's behavior or cause physical injury (i.e., harm). The result of exposure could be a temporary threshold shift in hearing due to fatigue of the auditory system, which can increase the risk of predation and reduce foraging or spawning success (Stadler and Woodbury 2009). When these effects take place, they are likely to reduce the survival, growth, and reproduction of the affected fish.

The City's consultant conducted an analysis of the effect of proposed pile driving. The analysis relies on data available from the Washington State Department of Transportation and is based on data from the Cape Disappointment Boat Launch and Friday Harbor Terminal projects, which used an air hammer similar to that proposed for the Schlagel Park project. The analysis is described in the BA.

Instantaneous injury. The BA estimates SPLs will be 194 dB_{peak}, 164 dB_{SEL}, and 175 dB_{RMS}, after accounting for sound attenuation measures. NMFS assumes a high likelihood of injury to salmonids from instantaneous pulses of SPLs above 206 dB_{peak}, which is greater than the estimated SPLs. Therefore, the proposed action is not expected to result in instantaneous injury to steelhead or salmon.

Cumulative strike effects. The BA indicates that the project may result in a cumulative SPL of 193 dB_{SEL}. Cumulative injury to salmonids is possible above 187 dB_{SEL} for salmonids weighing greater than 2 grams, and above 183 dB_{SEL} for salmonids weighing 2 grams or less. Based on fork length data of juvenile salmonids passing through the Columbia River presented by Cooney (2002) and the length curves presented by MacFarlane and Norton (2002) and Duffy (2003) juvenile salmonids in the action area will be heavier than 2 grams. The BA indicates that, per the NMFS calculator, SPLs will attenuate to below 187 dB_{SEL} within 82 feet of the pile driving location for fish larger than 2 grams. Therefore, it is possible that some steelhead and salmon

[1] dB_{peak} is referenced to 1 micropascal (re: 1µPa or one millionth of a pascal) throughout the rest of this document. A pascal is equal to 1 newton of force per square meter.
[2] dB_{SEL} is referenced to 1 micropascal squared seconds (re: $1\mu Pa^2 \cdot sec$) throughout the rest of this document.
[3] dB_{RMS} is referenced to 1 micropascal (re: 1µPa) throughout the rest of this document.

juveniles within 82 feet of the float will be injured by the cumulative effects of repeated pile strikes if they do not flee in response to pile driving.

Of these juvenile fish exposed to the effects of pile driving, some will be injured or killed. Injuries include non-auditory tissues as well as temporary threshold shifts in hearing sensitivity. A portion of these fish will be exposed to SPLs that can directly injure their tissues or reduce the hearing capability of the auditory system; which can lead to reductions in survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success (Stadler and Woodbury 2009).

It is difficult to determine the exact number of fish that will be injured or killed from the cumulative effects of pile driving for several reasons. First, the number of juvenile fish likely to be in the action area is unknown, but expected to be above zero; pile driving will occur in winter, a time of relatively low abundance. Second, it is unknown how far from the construction area fish will move in response to disturbance from general construction activities. Third, it is unknown what proportion of fish will move away from pile driving, reducing the cumulative impacts they absorb. A very conservative assumption is that all fish within 82 feet of pile driving, an area of approximately one-half acre, will be injured or killed. (This estimate assumes that the turbidity curtain is not deployed and that fish will not respond to harmful pile strikes by leaving the area.) However, it is more realistic to expect that some of the fish will move out of the area and not be subject to the repeated concussive impacts required to cause injury.

***Behavioral effects*.** Using the NMFS calculator, the BA estimates that SPLs would attenuate to below 150 dB_{RMS} within 1,522 feet of impact pile driving. However, due to the breakwater structures that separate most of the boat basin from the Columbia River, SPLs at or exceeding 150 dB_{RMS} are only expected to occur within the 10-acre boat basin.

We expect varying levels of behavioral responses from juvenile salmon and steelhead exposed to SPLs above 150 $dB_{RMS.}$ These responses range from no change, to mild awareness, to a startle response (Hastings and Popper 2005). None of these responses will cause injury or death.

Long-term Effects

The proposed action will result in the physical modification of park facilities including the parking lot, boat ramp, and float. The action will also result in some changes to the use of the facilities. The facilities are currently partially functional, although they do not meet modern safety standards and have experienced some deterioration; the south lane of the boat ramp has deteriorated to the extent that it has been closed to vehicles.

In the absence of the proposed action, NMFS expects that the existing facilities would persist as a feature in the nearshore and aquatic environment and affect fish habitat for a period of several decades or longer. This expectation is based on the fact that the facilities are primarily constructed of concrete, asphalt, and steel, which degrades slowly. The handling float appears very robust, being comprised of steel piles and steel grating. Even if continued deterioration of the ramp and float cause them to be unsafe or unusable for boaters, the structures themselves

would continue to affect physical habitat in the boat basin. It seems reasonable to expect that replacing the facilities with newer materials will extend the persistence of the facilities in the environment by perhaps several additional decades.

Increasing the capacity of the parking lot increases the potential for riparian impacts from pedestrian traffic somewhat, although not to the degree that effects to juvenile fish in the boat basin are expected. Construction of stormwater facilities for the parking lot will reduce the chronic input of PAHs, heavy metals, and other contaminants that are a chronic source of water pollution in the action area.

The City's replacement of in-water structures will reduce the size of the ramp below the ordinary high water mark (OHWM) by 2,047 square feet. The handling float will be widened from 5 feet to 6 feet to meet modern access standards per the ADA. This widening will increase the area of the float by 80 square feet, increasing the amount of overwater structure in the action area by .001 percent, although the new float will be comprised of modern grating that will allow more natural light to penetrate the float. The project will increase the number of piles by one. Reduction of the ramp size and modernizing the grating are expected to improve habitat very slightly, while increasing the float width and adding a pile are expected to degrade habitat very slightly. In sum, these changes are very minor and will not meaningfully change the footprint of the project or how listed fish or their predators and prey use the area for the next several decades.

However, the project will extend the persistence of a launch and float in the action area. In the absence of the proposed action, the existing facilities would persist for several decades. With the installation of new facilities and new materials, a float and ramp will be present for several additional decades. During those additional decades, the new structures are likely to support critical life functions of bass and possibly other non-native predators of juvenile steelhead and salmon, as reviewed by Carrasquero (2001). It is not possible to determine how many juvenile steelhead and salmon will be killed by predators as a consequence of the new structures in these additional decades; given the small area that the structures occupy and the expected low density of juvenile salmon and steelhead in the basin, the structures are expected to result in a small but persistent reduction in survival of juveniles in the action area.

As a consequence of the proposed action, the City will re-open the south lane of the boat ramp, which may cause some boat launching activity at other nearby facilities to be rerouted to the Schlagel Park launch because wait times to launch will be reduced. The City expects that this would lead to a minor change in boat traffic patterns in the area, and not increase overall boating activity. NMFS has no additional information with which to evaluate the City's conclusion.

2.5.2 Effects on Critical Habitat

Designated critical habitat within the action area for ESA-listed species considered in this opinion consists of freshwater rearing sites, freshwater migration corridors, and their essential PBFs. We expect that the water quality and natural cover PBFs could be affected by the proposed action.

Water quality. The proposed action could negatively affect water quality through short-term increases in turbidity or chemical contamination. As described above, we expect the proposed conservation measures will prevent leaks or spills from machinery from entering the Columbia River. Therefore, we do not expect any effects to water quality from chemical contamination.

We expect increases in turbidity from in-water portions of project activities, however, we expect these to be of short duration, and be mostly contained inside the turbidity curtain. These short-term increases in turbidity will not reduce the conservation value of critical habitat in the action area because the impacts will cover a small area and will be short-term (several weeks).

Natural cover. Extending the persistence of the float and boat launch by several decades will affect cover conditions in the Action Area. As described above, the proposed action is not expected to lead to a meaningful change in cover and substrate for several decades, but will have effects beyond that. The artificial in-water and overwater structure will harbor bass and potentially other non-native predators of juvenile steelhead and salmon such that the ability of the boat launch site to support successful freshwater rearing and migration will be diminished. Given the degraded environmental conditions in the action area, the proposed action will cause only marginal further degradation. For example, the 480-square-foot float represents only 1 percent of the overwater structure in the action area. Therefore, the proposed action is not expected to meaningfully reduce the conservation value of critical habitat at the action area scale.

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.

NMFS searched for information on future State, tribal, local, or private actions that were reasonably certain to occur in the action area. As most activities waterward of the OHWM require a Corps permit, NMFS anticipates that future actions within the action area will require an ESA section 7 consultation. In addition, most future State or tribal actions would likely have some form of Federal funding or authorization and therefore would be reviewed by NMFS.

The only reasonably certain cumulative effect identified by NMFS is continued use of the basin by private boaters. Boating activity in the basin is generally expected to cause minor behavioral disturbance for juvenile listed fish that does not cause injury or death.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is

likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

The environmental baseline in the Pasco Boat Basin is characterized by extensive overwater structure and little riparian cover. Water quality is likely poor due to stormwater runoff, little shade, and poor circulation between the basin and the Columbia River. Inundation by McNary Dam affects the action area by creating even slower moving water and poor water quality. Dams and reservoirs within the migratory corridor have altered the river environment and affected fish passage. The operation of water storage projects has altered the natural hydrograph in the action area. Water impoundment and dam operations affect water quality. It is likely that the action area contains numerous bass and other non-native predators that lead to high predation risk for any juvenile salmon and steelhead that enter the basin. The cumulative effects of State and private actions within the action area include continuing boating activity that is not expected to cause injury or death of listed salmonids.

Climate change is likely to affect the abundance and distribution of the ESA-listed species considered in the opinion. The exact effects of climate change are both uncertain and unlikely to be spatially homogeneous, and the ability of listed-species to adapt is uncertain. Climate change is likely to increase water temperature on average, degrading water quality in the action area.

The action area is likely used by juvenile UCR spring-run Chinook salmon, UCR steelhead, and MCR steelhead for winter rearing and during outmigration. Upper Columbia River spring-run Chinook salmon are listed as endangered. All three UCR spring-run Chinook salmon populations have an overall viability rating of high risk. The other species are listed as threatened, and while some populations are viable, most populations within these ESU/DPSs remain at moderate or high risk. Recovery of these species generally requires improvement in abundance of adult returns, productivity, spatial distribution in tributaries, and reduced diversity risks, though the specifics for each species and population vary.

Most effects of the proposed action are not expected to harm, injure, or kill listed species. However, impact pile driving is expected to injure or kill some juveniles within 82 feet of pile driving activity on the one day in which impact driving will occur. Juveniles that flee the area are not expected to be injured or killed, but some portion of fish that remain in the area and experience pressure waves from multiple strikes over the course of the day will be injured and/or killed.

It is unknown how many listed fish will be present in this area during the day that pile driving occurs, but work will occur during winter when densities of juvenile salmonids in the area are expected to be relatively low compared to the peak outmigration season. The area in which cumulative pile strikes could cause injury or death is approximately one-half acre, or 5 percent of the Pasco Boat Basin. The basin is far less than 1 percent of the Columbia River's McNary Reservoir. Given the: (1) very small area of effect compared to the range of the listed species, (2) timing of impact to a period when fish densities are low in the action area, and (3) fish that

vacate the impact area after several pile strikes will avoid injury and/or death, NMFS expects that very few individuals of any listed species will be injured or killed.

Replacing the boat launch and handling float with new materials is expected to extend the persistence of in-water and overwater structure; the existing facilities are anticipated to persist for several decades, but the new structures will persist for several additional decades, slightly increasing the predation rate on listed juveniles by non-native fish species at that time.

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

The proposed action has the potential to affect the water quality PBF within the action area. The primary effect of the action will be a short-term local increase in turbidity. This effect is not expected to reduce the conservation value of critical habitat within the action area. As we scale up from the action area to the designation of critical for each species, the proposed action is not expected to appreciably reduce the conservation value of the designated critical habitat.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of UCR Chinook salmon, UCR steelhead, or MCR steelhead, or destroy or adversely modify their designated critical habitat.

2.9 Incidental Take Statement

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

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

2.9.1 Amount or Extent of Take

In the opinion, NMFS determined that the proposed action was reasonably certain to result in incidental take as follows:

- Injury and death of juvenile salmon and steelhead from pile driving.
- Death of juvenile salmon from predation caused by extending the persistence of the boat launch and float in the environment.

It is not possible to determine the number of fish killed by the cumulative effects of sound pressure waves from repeated pile strikes or from extending the persistence of the boat launch and float. Therefore, NMFS uses a surrogate for incidental take. The surrogates are causally linked to the take pathways because, for sound pressure waves, the risk of injury and severity of injury increase with additional pile strikes, and more fish are exposed to possible injury when the time period of pile driving is longer. For extending the persistence of the launch and float in the environment, the risk of death increases with the size of the boat launch and float because larger structures are expected to harbor more predators.

The best available indicators to measure the extent of incidental take caused by the proposed action are:

- The number of pile strikes from an impact driver performed with a bubble curtain and wood block in use over the course of a single day.
- The square footage of the new float and boat ramp.

The extent of take will be exceeded if:

- More than 800 pile strikes from an impact driver are performed; or
- Pile strikes from an impact driver are performed without an effective bubble curtain and wood block to minimize the intensity of pressure waves; or
- The new float is greater than 480 square feet; or
- The new ramp is greater than 3,128 square feet.

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

2.9.2 Effect of Take

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

2.9.3 Reasonable and Prudent Measures

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

The Corps shall:

1. Monitor the project to ensure that the proposed conservation measures are meeting the objective of minimizing take and that the amount or extent of take is not exceeded.
2. Monitor to ensure that the amount and extent of take from extending the persistence of the boat launch and float is not exceeded.

2.9.4 Terms and Conditions

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

1. The following terms and conditions implement RPM 1:
    a. Within 1 year after authorizing the applicant to proceed with the project, the Corps shall submit a report to NMFS that includes the following.
        i. Dates of in-water work
        ii. Number of impact pile strikes
        iii. Description of mitigation measures (including bubble curtain, wood block, and other measures) employed to reduce propagation of sound pressure waves during impact pile driving.
        iv. Square footage of constructed float
        v. Square footage of constructed boat launch

2. If take is exceeded, contact NMFS promptly to determine a course of action.
    a. All reports will be sent to National Marine Fisheries Service, Attention: Sean Gross, 304 South Water Street, Suite 201, Ellensburg, Washington, 98926. Alternatively, reports can be emailed to CRBO.ConsultationRequest.WCR@noaa.gov.

2.10 Reinitiation of Consultation

This concludes formal consultation for the Schlagel Park Boat Launch project.

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

3. 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.

3.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion is the Corps. Other interested users could include the City of Pasco. Individual copies of this opinion were provided to the Corps. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov].

3.2 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.

3.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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