



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

**Refer to NMFS No:**  
**WCRO-2019-04045**

September 24, 2020

Michelle Walker  
Corps of Engineers, Seattle District  
Regulatory Branch CENWS-OD-RG  
P.O. Box 3755  
Seattle, Washington 98124-3755

**Re:** Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Stimson Marina Bulkhead Repair Project, King County, Washington (COE Number: NWS-2019-0674, HUC: 171100120400 – Lake Washington Ship Canal)

Dear Ms. Walker:

Thank you for your letter of December 5, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for U.S Army Corps of Engineers (COE) authorization of the Stimson Marina Repair Project.

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

The enclosed document contains the biological opinion (Opinion) prepared by the NMFS pursuant to section 7 of the ESA on the effects of the proposed action. In this Opinion, the NMFS concludes that the proposed action would adversely affect but is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon and PS Sound steelhead. The NMFS also concludes that the proposed action is likely to adversely affect designated critical habitat for PS Chinook salmon but is not likely to result in the destruction or adverse modification of that designated critical habitat.

This Opinion includes an incidental take statement (ITS) that describes reasonable and prudent measures (RPMs) the NMFS considers necessary or appropriate to minimize the incidental take associated with this action, and sets forth nondiscretionary terms and conditions that the COE must comply with to meet those measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

WCRO-2019-04045



Section 3 of this document includes our analysis of the action's likely effects on EFH for Pacific Coast Salmon pursuant to Section 305(b) of the MSA. Based on that analysis, the NMFS concluded that the action would adversely affect designated EFH for Pacific Coast Salmon. Therefore, we have provided 1 conservation recommendation that can be taken by the COE to avoid, minimize, or otherwise offset potential adverse effects on EFH. Because the NMFS concurs with the COE's determination that the action would not adversely affect EFH for coastal pelagic species and Pacific Coast groundfish, consultation under the MSA is not required for those EFHs.

Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving this recommendation. If the response is inconsistent with the EFH conservation recommendations, the COE must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation you clearly identify the number of conservation recommendations accepted.

Please contact Mary Bhuthimethee in the North Puget Sound Branch of the Oregon/Washington Coastal Office at (206) 526-4489, or by electronic mail at [mary.bhuthimethee@noaa.gov](mailto:mary.bhuthimethee@noaa.gov) if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kim W. Kratz".

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

cc: Colleen Anderson, COE

bcc: (OWCO – PDF (Read File))  
OWC/NPS – PDF (Babcock)  
OWC/NPS – PDF (Bhuthimethee)

PDF Copies sent to the following:

Michelle Walker, copy to  
NWS-ESA-Team@usace.army.mil

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

Stimson Marina Bulkhead Repair Project  
King County, Washington (COE Number: NWS-2019-0674)

**NMFS Consultation Number:** WCRO-2019-04045

**Action Agency:** U.S. Army Corps of Engineers

**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?
Chinook salmon ( <i>Oncorhynchus tshawytscha</i> ) Puget Sound (PS)	Threatened	Yes	No	Yes	No
Steelhead ( <i>O. mykiss</i> ) PS	Threatened	Yes	No	N/A	N/A


N/A = not applicable. The action area is outside designated critical habitat, or critical habitat has not been designated.

**Affected Essential Fish Habitat (EFH) and NMFS' Determinations:**

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	Yes	Yes

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

**Issued By:**

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

**Date:** September 24, 2020

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## 1. INTRODUCTION

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

### 1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402, as amended.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

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

### 1.2 Consultation History

On December 5, 2019, NMFS received a letter from the U.S. Army Corps of Engineers (COE) requesting formal consultation for the proposed action, and assigned it the NMFS technical assistance/inquiry number of INQ-2019-00333. The request included the COE's Memorandum for the Services (MFS) for the proposed action (COE 2019), a Biological Assessment and project drawings (Watershed Co. 2019a); however the quality of these documents NMFS received was low. On March 20, 2020, the project was assigned the NMFS tracking number of WCRO-2019-04045. After initial review of the submitted materials, NMFS contacted the COE for additional information and requested higher resolution copies of the BA and drawings. The COE provided additional information, the Washington State Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA, WDFW 2019), and higher resolution documents on the same day. The JARPA (Watershed Co. 2019b) and the Stimson Marina Stabilization Mitigation Plan (Watershed Co. 2019c) were shared with NMFS on April 13, 2020, after NMFS requested the information. In their Mitigation Plan (2019c), the consultant explains the reasoning behind their in-water stabilization approach for repair:

“The original stabilization concept was far along in the design process and would have reinforced the wall in a similar fashion, which could have been constructed landward of the wall, until soil borings showed contaminated soil immediately landward of the bulkhead. At this point, the City of Seattle prohibited the excavation of material within the parcel. It is presumed that these contaminated soils are a result of the property being previously used as a landfill for

contaminated sludge from previous canal dredging. Therefore, the project was limited to in-water stabilization solutions.”

NMFS conducted several phone calls with the applicant’s consultant, the COE, and King County Mitigation Reserves Program to determine potential ways to avoid, minimize or mitigate impacts from the proposed action, resulting in a modification to the proposed action. The applicant agreed to voluntarily pay \$6,300 to the King County Mitigation Reserves Program to offset impacts to listed species and critical habitat as a result of the project. NMFS initiated formal consultation on June 25, 2020.

### 1.3 Proposed Federal Action

Under the ESA, “Action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02), whereas under the MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The COE proposes to authorize Stimson Marina (the applicant) to repair an existing bulkhead by installing fifteen H-shaped piles via vibratory pile driver to a new steel waler secured to the bulkhead on the Lake Washington Ship Canal in Seattle, Washington (Figure 1). The project site is located at 5265 Shilshole Ave NW (47.66620 N latitude, -122.38735 W longitude).



**Figure 1.** Project location and proposed construction areas with bulkheads to be repaired in red.

Approximately 63 feet of bulkhead would be repaired, spanning the northwestern and southeastern construction areas (Figure 1). The project would include up to 5 days of work with a vibratory pile driver to install 15, 18x11-inch steel H-piles. No impact proofing of the piles is proposed. Up to 15 minutes of vibratory driving would be required per pile, and a maximum of 5 piles could be installed per day. The work would be done between October 1 and April 15.

Six piles would be installed in the southeastern construction area and nine piles installed in the northwestern construction area, immediately waterward of the bulkhead. The piles will be secured to the bulkhead by a steel waler installed behind the existing piles and anchored to the bulkhead. The steel piles will extend an additional six inches past the existing wooden piles, creating a cumulative surface area of 2.49 square feet (sq ft). The piles will be the only infrastructure placed below the waterline. The existing piles will remain in place in order to maintain stability for the bulkhead below the waterline. All work and materials will be staged from the parking lot, a barge will not be necessary.

To mitigate potential adverse effects of the proposed project, the contractor would be required to adhere to the agency-approved work window when juvenile salmonids are least likely to be present in the action area (October 1 – April 15). The consultant would require their contractors to comply with all conservation measures and best management practices (BMP) identified in their BA (Watershed Co. 2019a) and with the provisions identified in the WDFW HPA for this project (WDFW 2019). A containment boom with a full-depth sediment curtain would be deployed around each work area while in-water work is being conducted to contain all impacts to the immediate area within the containment boom and negate the potential impacts of this project (sediment plumes, oil, and other machinery fluid spills) outside of the construction areas. If debris or machinery fluid of any kind accidentally enters the waterway, immediate actions would be taken to remove the material/substance and properly disposed of it at an approved off-site facility. In addition, as part of their proposed action, the applicant agrees to voluntarily pay \$100 per linear foot of bulkhead to be repaired ( $\$100 \times 63$  linear feet = \$6,300) to the King County Mitigation Reserves Program to offset impacts to listed species and critical habitat as a result of the project.

We considered whether or not the proposed action would cause any other impacts and determined that the action would extend the life of the bulkhead and contribute to the continued existence of the 3,000 sq ft parking area immediately landward of the bulkhead and the stormwater input associated with that section of impervious surface. We based this determination on the applicant's reported purpose for the repair, which is to stabilize the bulkhead to prevent the parking lot from moving further waterward and further damage. Therefore, we have also analyzed the effects of the stormwater associated with the parking lot in the effects section of this Opinion.

## **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.

The COE determined that the proposed action is likely to adversely affect PS Chinook salmon and PS steelhead, is likely to adversely affect designated critical habitat for PS Chinook salmon, and would have no effect on designated critical habitat for PS steelhead because the action area has been excluded from that designation (Table 1).

**Table 1.** ESA-listed species and critical habitat that may be affected by the proposed action.

ESA-listed species and critical habitat likely to be adversely affected (LAA)				
Species	Status	Species	Critical Habitat	Listed / CH Designated
Chinook salmon ( <i>Oncorhynchus tshawytscha</i> ) Puget Sound	Threatened	LAA	LAA	06/28/05 (70 FR 37160) / 09/02/05 (70 FR 52630)
steelhead ( <i>O. mykiss</i> ) Puget Sound	Threatened	LAA	N/A	05/11/07 (72 FR 26722) / 02/24/16 (81 FR 9252)

LAA = likely to adversely affect

N/A = not applicable. The action area is outside designated critical habitat, or critical habitat has not been designated.

## 2.1 Analytical Approach

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

This biological opinion 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:

- Evaluate the range-wide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

## **2.2 Rangewide Status of the Species and Critical Habitat**

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species’ likelihood of both survival and recovery. The species status section also helps to inform the description of the species’ “reproduction, numbers, or distribution” 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.

The summaries that follow describe the status of the ESA-listed species, and their designated critical habitats, that occur within the action area and are considered in this opinion. More detailed information on the biology, habitat, and conservation status and trend of these listed resources can be found in the listing regulations and critical habitat designations published in the Federal Register and in the recovery plans and other sources at: <https://www.fisheries.noaa.gov/species-directory/threatened-endangered>, and are incorporated here by reference.

### **Listed Species**

Viable Salmonid Population (VSP) Criteria: For Pacific salmonids, we commonly use four VSP criteria (McElhany et al. 2000) to assess the viability of the populations that constitute the

species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

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

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits.

"Abundance" generally refers to the number of naturally-produced adults that return to their natal spawning grounds.

"Productivity" refers to 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 in decline.

For species with multiple populations, we assess the status of the entire species based on the biological status of the constituent populations, 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 occur within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register.

Puget Sound (PS) Chinook Salmon: The PS Chinook salmon evolutionarily significant unit (ESU) was listed as threatened on June 28, 2005 (70 FR 37160). We adopted the recovery plan for this ESU in January 2007. The recovery plan consists of two documents: the Puget Sound salmon recovery plan (SSPS 2007) and the final supplement to the Shared Strategy's Puget Sound salmon recovery plan (NMFS 2006). The recovery plan adopts ESU and population level viability criteria recommended by the Puget Sound Technical Recovery Team (PSTRT) (Ruckelshaus et al. 2002). The PSTRT's biological recovery criteria will be met when all of the following conditions are achieved:

- The viability status of all populations in the ESU is improved from current conditions, and when considered in the aggregate, persistence of the ESU is assured;

- Two to four Chinook salmon populations in each of the five biogeographical regions of the ESU achieve viability, depending on the historical biological characteristics and acceptable risk levels for populations within each region;
- At least one population from each major genetic and life history group historically present within each of the five biogeographical regions is viable;
- Tributaries to Puget Sound not identified as primary freshwater habitat for any of the 22 identified populations are functioning in a manner that is sufficient to support an ESU-wide recovery scenario; Production of Chinook salmon from tributaries to Puget Sound not identified as primary freshwater habitat for any of the 22 identified populations occurs in a manner consistent with ESU recovery; and
- Populations that do not meet all the Viable Salmon Population (VSP) parameters are sustained to provide ecological functions and preserve options for ESU recovery.

General Life History: Chinook salmon are anadromous fish that require well-oxygenated water that is typically less than 63° F (17° C), but some tolerance to higher temperatures is documented with acclimation. Adult Chinook salmon spawn in freshwater streams, depositing fertilized eggs in gravel “nests” called redds. The eggs incubate for three to five months before juveniles hatch and emerge from the gravel. Juveniles spend from three months to two years in freshwater before migrating to the ocean to feed and mature. Chinook salmon spend from one to six years in the ocean before returning to their natal freshwater streams where they spawn and then die.

Chinook salmon are divided into two races, stream-types and ocean-types, based on the major juvenile development strategies. Stream-type Chinook salmon tend to rear in freshwater for a year or more before entering marine waters. Conversely, ocean-type juveniles tend to leave their natal streams early during their first year of life, and rear in estuarine waters as they transition into their marine life stage. Both stream- and ocean-type Chinook salmon are present, but ocean-type Chinook salmon predominate in Puget Sound populations.

Chinook salmon are further grouped into “runs” that are based on the timing of adults that return to freshwater. Early- or spring-run chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and finally spawn in the late summer and early autumn. Late- or fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas, and spawn within a few days or weeks. Summer-run fish show intermediate characteristics of spring and fall runs, without the extensive delay in maturation exhibited by spring-run Chinook salmon. In Puget Sound, spring-run Chinook salmon tend to enter their natal rivers as early as March, but do not spawn until mid-August through September. Returning summer- and fall-run fish tend to enter the rivers early-June through early-September, with spawning occurring between early August and late-October.

Yearling stream-type fish tend to leave their natal rivers late winter through spring, and move relatively directly to nearshore marine areas and pocket estuaries. Out-migrating ocean-type fry tend to migrate out of their natal streams beginning in early-March. Those fish rear in the tidal delta estuaries of their natal stream for about two weeks to two months before migrating to marine nearshore areas and pocket estuaries in late May to June. Out-migrating young of the year parr tend to move relatively directly into marine nearshore areas and pocket estuaries after leaving their natal streams between late spring and the end of summer.

**Spatial Structure and Diversity:** The PS Sound Chinook salmon ESU includes all naturally spawning populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Straits of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound and the Strait of Georgia in Washington. The ESU also includes the progeny of numerous artificial propagation programs (NWFSC 2015). The PSTRT identified 22 extant populations, grouped into five major geographic regions, based on consideration of historical distribution, geographic isolation, dispersal rates, genetic data, life history information, population dynamics, and environmental and ecological diversity. The PSTRT distributed the 22 populations among five major biogeographical regions, or major population groups (MPGs), that are based on similarities in hydrographic, biogeographic, and geologic characteristics (Table 2).

**Table 2.** Extant PS Chinook salmon populations in each biogeographic region (Ruckelshaus et al. 2002, NWFSC 2015).

<b>Biogeographic Region</b>	<b>Population (Watershed)</b>
Strait of Georgia	North Fork Nooksack River
	South Fork Nooksack River
Strait of Juan de Fuca	Elwha River
	Dungeness River
Hood Canal	Skokomish River
	Mid Hood Canal River
Whidbey Basin	Skykomish River
	Snoqualmie River
	North Fork Stillaguamish River
	South Fork Stillaguamish River
	Upper Skagit River
	Lower Skagit River
	Upper Sauk River
	Lower Sauk River
	Suiattle River
	Upper Cascade River
Central/South Puget Sound Basin	Cedar River
	North Lake Washington/ Sammamish River
	Green/Duwamish River
	Puyallup River
	White River
Nisqually River	

Hatchery-origin spawners are present in high fractions in most populations within the ESU, with the Whidbey Basin the only MPG with consistently high fractions of natural-origin spawners. Between 1990 and 2014, the fraction of natural-origin spawners has declined in many of the populations outside of the Skagit watershed (NWFSC 2015).

**Abundance and Productivity:** Available data on total abundance since 1980 indicate that abundance trends have fluctuated between positive and negative for individual populations, but productivity remains low in most populations, and hatchery-origin spawners are present in high fractions in most populations outside of the Skagit watershed. Available data now show that

most populations have declined in abundance over the past 7 to 10 years. Further, escapement levels for all populations remain well below the PSTRT planning ranges for recovery, and most populations are consistently below the spawner-recruit levels identified by the PSTRT as consistent with recovery (NWFSC 2015). The current information on abundance, productivity, spatial structure and diversity suggest that the Whidbey Basin MPG is at relatively low risk of extinction. The other four MPGs are considered to be at high risk of extinction due to low abundance and productivity (NWFSC 2015). The most recent 5-year status review concluded that the ESU should remain listed as threatened (NMFS 2017).

Limiting Factors: Factors limiting recovery for PS Chinook salmon include:

- Degraded floodplain and in-river channel structure
- Degraded estuarine conditions and loss of estuarine habitat
- Riparian area degradation and loss of in-river large woody debris
- Excessive fine-grained sediment in spawning gravel
- Degraded water quality and temperature
- Degraded nearshore conditions
- Impaired passage for migrating fish
- Severely altered flow regime

PS Chinook Salmon within the Action Area: The PS Chinook salmon that are likely to occur in the action area would be fall-run Chinook salmon from the Cedar River population and from the North Lake Washington / Sammamish River population (NWFSC 2015; WDFW 2020a). Both stream- and ocean-type Chinook salmon are present in these populations, with the majority being ocean-types.

The Cedar River population is relatively small, with a total annual abundance fluctuating at close to 1,000 fish (NWFSC 2015; WDFW 2020b). Between 1965 and 2019, the total abundance for PS Chinook salmon in the basin has fluctuated between about 133 and 2,451 individuals, with the average trend being slightly negative. The 2015 status review reported that the 2010 through 2014 5-year geometric mean for natural-origin spawner abundance had shown a positive change since the 2010 status review, with natural-origin spawners accounting for about 82% of the population. WDFW data suggest that natural-origin spawners accounted for about 71% of a combined total return of 855 fish in 2019 (WDFW 2020b).

The North Lake Washington / Sammamish River population is also small, with a total abundance that has fluctuated between about 33 and 2,223 individuals from 1983 through 2019. Natural-origin spawners make up a small proportion of the total population, accounting for about 30% of the 365 total return in 2019, and the trend is rather flat to slightly negative (NWFSC 2015; WDFW 2020b).

All returning adults and out-migrating juveniles of these two populations, as well as individuals that spawn in the numerous smaller streams across the basin, must pass through the action area to complete their life cycles. Adult Chinook salmon pass through Chittenden Locks (aka Ballard Locks) between mid-June through September, with peak migration occurring in mid-August (City of Seattle 2008). Spawning occurs well upstream of the action area between early August

and late October. Juvenile Chinook salmon are found in Lake Washington and Lake Sammamish between January and July, primarily in the littoral zone (Tabor et al. 2006). Outmigration through the ship canal and past the action area to the locks occurs between late-May and early-July, with the peak in June (City of Seattle 2008).

**Puget Sound (PS) steelhead:** The PS steelhead distinct population segment (DPS) was listed as threatened on May 11, 2007 (72 FR 26722). The recovery plan for this DPS is under development. In 2013, the Puget Sound Steelhead Technical Recovery Team (PSSTRT) identified 32 demographically independent populations (DIPs) within the DPS, based on genetic, environmental, and life history characteristics. Those DIPs are distributed among three geographically-based major population groups (MPGs); Northern Cascades, Central and South Puget Sound; and Hood Canal and Strait de Fuca (Myers et al. 2015) (Table 3).

**Table 3.** PS steelhead Major Population Groups (MPGs), Demographically Independent Populations (DIPs), and DIP Viability Estimates (Modified from Figure 58 in Hard *et al.* 2015).

<b>Geographic Region (MPG)</b>	<b>Demographically Independent Population (DIP)</b>	<b>Viability</b>
Northern Cascades	Drayton Harbor Tributaries Winter Run	Moderate
	Nooksack River Winter Run	Moderate
	South Fork Nooksack River Summer Run	Moderate
	Samish River/Bellingham Bay Tributaries Winter Run	Moderate
	Skagit River Summer Run and Winter Run	Moderate
	Nookachamps River Winter Run	Moderate
	Baker River Summer Run and Winter Run	Moderate
	Sauk River Summer Run and Winter Run	Moderate
	Stillaguamish River Winter Run	Low
	Deer Creek Summer Run	Moderate
	Canyon Creek Summer Run	Moderate
	Snohomish/Skykomish Rivers Winter Run	Moderate
	Pilchuck River Winter Run	Low
	North Fork Skykomish River Summer Run	Moderate
	Snoqualmie River Winter Run	Moderate
Tolt River Summer Run	Moderate	
Central and South Puget Sound	Cedar River Summer Run and Winter Run	Low
	North Lake Washington and Lake Sammamish Winter Run	Moderate
	Green River Winter Run	Low
	Puyallup River Winter Run	Low
	White River Winter Run	Low
	Nisqually River Winter Run	Low
	South Sound Tributaries Winter Run	Moderate
East Kitsap Peninsula Tributaries Winter Run	Moderate	
Hood Canal and Strait de Fuca	East Hood Canal Winter Run	Low
	South Hood Canal Tributaries Winter Run	Low
	Skokomish River Winter Run	Low
	West Hood Canal Tributaries Winter Run	Moderate
	Sequim/Discovery Bay Tributaries Winter Run	Low
	Dungeness River Summer Run and Winter Run	Moderate
	Strait of Juan de Fuca Tributaries Winter Run	Low
Elwha River Summer Run and Winter Run	Low	

In 2015, the PSSTRT concluded that the DPS is at “very low” viability; with most of the 32 DIPs and all three MPGs at “low” viability based on widespread diminished abundance, productivity, diversity, and spatial structure when compared with available historical evidence (Hard et al. 2015). Based on the PSSTRT viability criteria, the DPS would be considered viable when all three component MPG are considered viable. A given MPG would be considered viable when: 1) 40 percent or more of its component DIP are viable; 2) mean DIP viability within the MPG exceeds the threshold for viability; and 3) 40 percent or more of the historic life history strategies (i.e., summer runs and winter runs) within the MPG are viable. For a given DIP to be considered viable, its probability of persistence must exceed 85 percent, as calculated by Hard et al. (2015), based on abundance, productivity, diversity, and spatial structure within the DIP.

General Life History: PS steelhead exhibit two major life history strategies. Ocean-maturing, or winter-run fish typically enter freshwater from November to April at an advanced stage of maturation, and then spawn from February through June. Stream-maturing, or summer-run fish typically enter freshwater from May to October at an early stage of maturation, migrate to headwater areas, and hold for several months prior to spawning in the following spring. After hatching, juveniles rear in freshwater from one to three years prior to migrating to marine habitats (two years is typical). Smoltification and seaward migration typically occurs from April to mid-May. Smolt lengths vary between watersheds, but typically range from 4.3 to 9.2 inches (109 to 235 mm) (Myers et al. 2015). Juvenile steelhead are generally independent of shallow nearshore areas soon after entering marine water (Bax et al. 1978, Brennan et al. 2004, Schreiner et al. 1977), and are not commonly caught in beach seine surveys. Recent acoustic tagging studies (Moore et al. 2010) have shown that smolts migrate from rivers to the Strait of Juan de Fuca from one to three weeks. PS steelhead feed in the ocean waters for one to three years (two years is again typical), before returning to their natal streams to spawn. Unlike Chinook salmon, most female steelhead, and some males, return to marine waters following spawning (Myers et al. 2015).

Spatial Structure and Diversity: The PS steelhead DPS includes all naturally spawned anadromous steelhead populations in streams in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek (inclusive). The DPS also includes six hatchery stocks that are considered no more than moderately diverged from their associated natural-origin counterparts (USDC 2014). PS steelhead are the anadromous form of *O. mykiss* that occur below natural barriers to migration in northwestern Washington State (NWFSC 2015). Non-anadromous “resident” *O. mykiss* (a.k.a. rainbow trout) occur within the range of PS steelhead but are not part of the DPS due to marked differences in physical, physiological, ecological, and behavioral characteristics (Hard et al. 2015). As stated above, the DPS consists of 32 DIP that are distributed among three geographically-based MPG. An individual DIP may consist of winter-run only, summer-run only, or a combination of both life history types. Winter-run is the predominant life history type in the DPS (Hard et al. 2015).

Abundance and Productivity: Available data on total abundance since the late 1970s and early 1980s indicate that abundance trends have fluctuated between positive and negative for individual DIP. However, low productivity persists throughout the 32 DIP, with most showing downward trends, and a few showing sharply downward trends (Hard et al. 2015, NWFSC



2015). Since the mid-1980s, trends in natural spawning abundance have also been temporally variable for most DIP but remain predominantly negative, and well below replacement for at least 8 of the DIP (NWFSC 2015). Smoothed abundance trends since 2009 show modest increases for 13 DIP. However, those trends are similar to variability seen across the DPS, where brief periods of increase are followed by decades of decline. Further, several of the upward trends are not statistically different from neutral, and most populations remain small. Nine of the evaluated DIP had geometric mean abundances of fewer than 250 adults, and 12 had fewer than 500 adults (NWFSC 2015). Over the time series examined, the over-all abundance trends, especially for natural spawners, remain predominantly negative or flat across the DPS, and general steelhead abundance across the DPS remains well below the level needed to sustain natural production into the future (NWFSC 2015). The PSSTRT recently concluded that the PS steelhead DPS is currently not viable (Hard et al. 2015). The DPS's current abundance and productivity are considered to be well below the targets needed to achieve delisting and recovery. Growth rates are currently declining at 3 to 10% annually for all but a few DIPs, and the extinction risk for most populations is estimated to be moderate to high. The most recent 5-year status review concluded that the DPS should remain listed as threatened (NMFS 2017).

Limiting Factors: Factors limiting recovery for PS steelhead include:

- The continued destruction and modification of steelhead habitat
- Widespread declines in adult abundance (total run size), despite significant reductions in harvest in recent years
- Threats to diversity posed by use of two hatchery steelhead stocks (Chambers Creek and Skamania)
- Declining diversity in the DPS, including the uncertain but weak status of summer run fish
- A reduction in spatial structure
- Reduced habitat quality through changes in river hydrology, temperature profile, downstream gravel recruitment, and reduced movement of large woody debris
- In the lower reaches of many rivers and their tributaries in Puget Sound where urban development has occurred, increased flood frequency and peak flows during storms and reduced groundwater-driven summer flows, with resultant gravel scour, bank erosion, and sediment deposition
- Dikes, hardening of banks with riprap, and channelization, which have reduced river braiding and sinuosity, increasing the likelihood of gravel scour and dislocation of rearing juveniles

PS Steelhead within the Action Area: The PS steelhead populations that occur in the action area consist of winter-runs from the Cedar River and North Lake Washington / Lake Sammamish populations. Both populations are among the smallest within the DPS (NWFSC 2015; WDFW 2020c). WDFW reports that the total PS steelhead abundance in the Cedar River basin has fluctuated between 0 and 900 individuals between 1984 and 2018, with a strong negative trend. Since 2000, the total annual abundance has remained under 50 fish. NWFSC (2015) suggests that the returns may have been above 1,000 individuals during the 1980s, but agrees with the steep decline to less than 100 fish since 2000. It is unclear what proportion of the returns are natural-origin spawners, if any, and a total of only 4 adults are thought to have returned in 2018 (WDFW 2020c). The Sammamish River population is even smaller. WDFW reports that the total abundance for PS steelhead in the North Lake Washington / Lake Sammamish basin fluctuated

between 0 and 916 individuals between 1984 and the last survey in 1999, with a strong negative trend. Abundance never exceeded 45 fish after 1992, and was only 4 in 1999 (WDFW 2020c). NWFSC (2015) disagrees with WDFW in that returns may have been above 1,500 individuals during the mid-1980s, but NWFSC agrees with the steep decline to virtually no steelhead in the basin since 2000.

All returning adults and out-migrating juveniles of these two populations must pass the action area to complete their life cycles. Adult steelhead pass through Chittenden Locks (aka Ballard Locks) and the Lake Washington Ship Canal between January and May, and may remain within Lake Washington through June (City of Seattle 2008). The timing of steelhead spawning in the basin is uncertain, but occurs well upstream of the action area. Juvenile steelhead enter Lake Washington in April, and typically migrate through the ship canal and past the action area to the locks between April and May (City of Seattle 2008).

### **Critical Habitat**

This section describes the status of designated critical habitat that would be affected by the proposed action by examining the condition and trends of physical or biological features (PBFs) that are essential to the conservation of the listed species throughout the designated areas. The PBFs are essential because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging). The proposed project would affect critical habitat for PS Chinook salmon.

The NMFS designated critical habitat for PS Chinook salmon on September 2, 2005 (70 FR 52630). That critical habitat is located in 16 freshwater subbasins and watersheds between the Dungeness/Elwha Watershed and the Nooksack Subbasin, inclusively, as well as in nearshore marine waters of the Puget Sound that are south of the US-Canada border and east of the Elwha River, and out to a depth of 30 meters. Although offshore marine is an area type identified in the final rule, it was not designated as critical habitat for PS Chinook salmon.

The PBFs of salmonid critical habitat include: (1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development; (2) Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks; (3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival; (4) Estuarine areas free of obstruction and excessive predation with: (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation; (5) Nearshore marine areas free of obstruction and excessive predation with: (i) Water quality and quantity conditions and

forage, including aquatic invertebrates and fishes, supporting growth and maturation; and (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and (6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation. The PBF for PS Chinook salmon CH are listed in Table 4.

**Table 4.** Physical or biological features (PBFs) of designated critical habitat for PS Chinook salmon, and corresponding life history events. Although offshore marine areas were identified in the final rule, none was designated as critical habitat.

Physical or Biological Features		Life History Event
Site Type	Site Attribute	
Freshwater spawning	Water quantity Water quality Substrate	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Water quantity and Floodplain connectivity Water quality and Forage Natural cover	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	(Free of obstruction and excessive predation) Water quantity and quality Natural cover	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine	(Free of obstruction and excessive predation) Water quality, quantity, and salinity Natural cover Forage	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	(Free of obstruction and excessive predation) Water quality, quantity, and forage Natural cover	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing
Offshore marine	Water quality and forage	Adult growth and sexual maturation Adult spawning migration Subadult rearing

Major tributary river basins in the Puget Sound basin include the Nooksack, Samish, Skagit, Sauk, Stillaguamish, Snohomish, Lake Washington, Cedar, Sammamish, Green, Duwamish, Puyallup, White, Carbon, Nisqually, Deschutes, Skokomish, Duckabush, Dosewallips, Big Quilcene, Elwha, and Dungeness rivers and Soos Creek. Critical habitat throughout the Puget Sound basin has been degraded by numerous activities, including hydropower development, loss of mature riparian forests, increased sediment inputs, removal of large wood from the waterways, intense urbanization, agriculture, alteration of floodplain and stream morphology (i.e., channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, dredging, armoring of shorelines, marina and port development, road and railroad construction and maintenance, logging, and mining. Changes in habitat quantity, availability, and diversity, and flow, temperature, sediment load and channel instability are common limiting factors of critical habitat throughout the basin.

Land use practices have likely accelerated the frequency of landslides delivering sediment to streams. Fine sediment from unpaved roads also contributes to stream sedimentation. Unpaved roads are widespread on forested lands in the Puget Sound basin, and to a lesser extent, in rural residential areas. Historical logging removed most of the riparian trees near stream channels. Subsequent agricultural and urban conversion permanently altered riparian vegetation in the river valleys, leaving either no trees, or a thin band of trees. The riparian zones along many agricultural areas are now dominated by alder, invasive canary grass and blackberries, and provide substantially reduced stream shade and large wood recruitment (SSPS 2007).

Diking, agriculture, revetments, railroads and roads in lower stream reaches have caused significant loss of secondary channels in major valley floodplains in this region. Confined main channels create high-energy peak flows that remove smaller substrate particles and large wood. The loss of side-channels, oxbow lakes, and backwater habitats has resulted in a significant loss of juvenile salmonid rearing and refuge habitat. When the water level of Lake Washington was lowered 9 feet in the 1910s, thousands of acres of wetlands along the shoreline of Lake Washington, Lake Sammamish and the Sammamish River corridor were drained and converted to agricultural and urban uses. Wetlands play an important role in hydrologic processes, as they store water which ameliorates high and low flows. The interchange of surface and groundwater in complex stream and wetland systems helps to moderate stream temperatures. Thousands of acres of lowland wetlands across the region have been drained and converted to agricultural and urban uses, and forest wetlands are estimated to have diminished by one-third in Washington State (FEMAT 1993; Spence et al. 1996; SSPS 2007).

Loss of riparian habitat, elevated water temperatures, elevated levels of nutrients, increased nitrogen and phosphorus, and higher levels of suspended sediment, presumably from urban and highway runoff, wastewater treatment, failing septic systems, and agriculture or livestock impacts, have been documented in many Puget Sound tributaries (SSPS 2007).

Peak stream flows have increased over time due to paving (roads and parking areas), reduced percolation through surface soils on residential and agricultural lands, simplified and extended drainage networks, loss of wetlands, and rain-on-snow events in higher elevation clear cuts (SSPS 2007). In urbanized Puget Sound, there is a strong association between land use and land cover attributes and rates of coho spawner mortality likely due to runoff containing contaminants emitted from motor vehicles (Feist et al. 2011).

Dams constructed for hydropower generation, irrigation, or flood control have substantially affected PS Chinook salmon populations in a number of river systems. The construction and operation of dams have blocked access to spawning and rearing habitat, changed flow patterns, resulted in elevated temperatures and stranding of juvenile migrants, and degraded downstream spawning and rearing habitat by reducing recruitment of spawning gravel and large wood to downstream areas (SSPS 2007). These actions tend to promote downstream channel incision and simplification (Kondolf 1997), limiting fish habitat. Water withdrawals reduce available fish habitat and alter sediment transport. Hydropower projects often change flow rates, stranding and killing fish, and reducing aquatic invertebrate (food source) productivity (Hunter 1992).

Juvenile mortality occurs in unscreened or inadequately screened diversions. Water diversion ditches resemble side channels in which juvenile salmonids normally find refuge. When diversion headgates are shut, access back to the main channel is cut off and the channel goes dry. Mortality can also occur with inadequately screened diversions from impingement on the screen, or mutilation in pumps where gaps or oversized screen openings allow juveniles to get into the system. Blockages by dams, water diversions, and shifts in flow regime due to hydroelectric development and flood control projects are major habitat problems in many Puget Sound tributary basins (SSPS 2007).

The nearshore marine habitat has been extensively altered and armored by industrial and residential development near the mouths of many of Puget Sound's tributaries. A railroad runs along large portions of the eastern shoreline of Puget Sound, eliminating natural cover along the shore and natural recruitment of beach sand (SSPS 2007).

Degradation of the near-shore environment has occurred in the southeastern areas of Hood Canal in recent years, resulting in late summer marine oxygen depletion and significant fish kills. Circulation of marine waters is naturally limited, and partially driven by freshwater runoff, which is often low in the late summer. However, human development has increased nutrient loads from failing septic systems along the shoreline, and from use of nitrate and phosphate fertilizers on lawns and farms. Shoreline residential development is widespread and dense in many places. The combination of highways and dense residential development has degraded certain physical and chemical characteristics of the near-shore environment (HCCC 2005; SSPS 2007).

Critical Habitat within the Action Area: Critical habitat has been designated for PS Chinook salmon along the entire length of the Lake Washington Ship Canal, all of Lake Washington, about 950 yards upstream into the Sammamish River, and well upstream into the Cedar River watershed. The critical habitat in the Lake Washington Ship Canal provides the Freshwater Migration PBF for PS Chinook (NOAA 2020; WDFW 2020a).

### **2.3 Action Area**

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

As described in the BA, noise generated by the equipment used to install the piles (vibratory pile driver) will be the primary impact associated with the proposed project. Exposure to elevated noise would be the project-related stressor with the greatest range of effect. The action area for NMFS trust resources is considered to include the waters and substrates of the Lake Washington Ship Canal within 100 yards of the project site. This action area overlaps with the geographic ranges and boundaries of the ESA-listed species and designated critical habitat identified earlier in Table 1. The action area also overlaps with areas that have been designated, under the MSA, as EFH for Pacific Coast salmon.

For this project the affected area is defined by the sound pressure levels that would result from pile driving, further detailed in Section 2.5 Elevated Noise. Application of the practical spreading loss equation to the estimated SLs (in-water source sound level at 1 meter from the source)

suggests that noise levels above the 206 dB<sub>peak</sub> (decibels) threshold could extend about 28 feet (8.6 m) from pile driving work. Noise levels above the 183 and 187 dB SEL<sub>cum</sub> (sound exposure level) thresholds could theoretically extend to about 8,241 and 4,459 feet (2,511 and 1,359 m), respectively. SEL noise levels would theoretically fall to the 150 dB<sub>SEL</sub> threshold for effective quiet at 4,459 feet as well. Therefore, any fish within 4,459 feet of the project site are likely to experience a range of impacts that would depend on their distance from the source and the duration of their exposure.

## 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).

Environmental conditions at the project site and the surrounding area: The project site is located in Seattle, along the northern shore of the Lake Washington Ship Canal (Figure 1). The geography and ecosystems in and adjacent to the action area have been dramatically altered by human activity since European settlers first arrived in the 1800s. Historically, a small stream flowed from Lake Union to Shilshole Bay, with no surface water connection between Lake Union and Lake Washington. The waters of Lake Washington flowed south to the Duwamish River via the now absent Black River. The canal was created by intense dredging and excavation that began in the 1880s to provide a navigable passage between Lake Washington and the marine waters of Shilshole Bay. The canal is 8.6 miles long, about 150 to 260 feet wide in the cuts, and widens at Portage Bay, Lake Union, and Salmon Bay. The average depth in the navigational channel is about 30 feet. Depths along the edges are typically between 10 and 20 feet.

The canal was completed in 1916. As part of this, the Hiram M. Chittenden Locks (aka Ballard Locks) were constructed near the west end of the canal to maintain navigable water levels in the canal and lakes. This permanently converted Salmon Bay from an estuary to freshwater. Flows through canal are highly controlled by the locks, and are typically very slow, and the canal supports high levels of commercial and recreational vessel traffic.

Little natural shoreline exists in the ship canal, which was constructed during a time when little was known about the environmental needs of the ESA-listed salmonids that now depend on it. In cross-section, the canal closely resembles an elongated box culvert along most of its length, and about 96% of the canal’s banks are armored (City of Seattle 2008). Instead of slopes that gently rise to the surface, as typically occurs along the banks of natural streams, the bank slope along most of the canal is vertical, with depths of tens of feet.

The vast majority of the shoreline from Lake Washington to Shilshole Bay is lined by shipyards, industrial properties, large marinas, and residential piers. Unbroken urban development extends north and south immediately landward of both shorelines. With the exception of the southern shoreline of Portage Bay, and along the armored banks of the Fremont and Mountlake Cuts, very little riparian vegetation exists along the banks of the canal.

Water quality within the area is influenced by the inflow of freshwater from Lake Washington, by point and non-point discharges all along the waterway, and by a saltwater lens that intrudes through the Ballard Locks, underlays the outflowing freshwater, and occasionally extends into Lake Union. Industrial, commercial, and residential development has impacted water quality in the canal since before the canal was completed in 1916. Lumber and plywood mills, machine shops, metal foundries, fuel and oil facilities, concrete and asphalt companies, and power plants were quickly developed along the shoreline of the waterway, along with numerous shipyards, marinas, commercial docks, and houseboats. Virtually all of the early industrial, commercial, and residential facilities discharged untreated wastes directly to the waterway, some of which persisted into the 1940s and beyond. Tomlinson (1977) cites a 1943 Washington State Pollution Commission report that indicated that the Seattle Gas Plant (now Gasworks Park) discharged oily wastes so routinely that the water surface was covered and fish kills occurred in its vicinity. The report also identified raw sewage discharge into the waterway from most of the residences, commercial establishments, and all of the houseboats that lined the shoreline. Stormwater drainage has also contributed to pollutant loading. Most of the direct discharge of raw sewage was stopped and the gas plant ceased operation during the 1960s.

The City of Seattle (1987) reported water quality problems in the canal that included saltwater intrusion, low dissolved oxygen (DO), and elevated fecal coliform, as well as sediments that were contaminated with Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), cadmium, chromium, lead, mercury, nickel, and zinc, particularly in the area off the former Seattle Gas Plant. Today, the overall water quality in the ship canal has improved substantially. However, Lake Union and the ship canal are included on the Washington State Department of Ecology's (WDOE) list of impaired and threatened water bodies for total phosphorus, fecal coliform bacteria, lead, and the insecticide aldrin in the water column, and for sediment bioassay (City of Seattle 2010). The most likely sources of phosphorus and fecal coliform are point and nonpoint stormwater discharges. Other sources of fecal coliform include wastes from domestic pets and waterfowl, and sewage from boats (City of Seattle 2010).

Although total copper and total lead concentrations have exceeded state water quality criteria for acute toxicity in the past (Herrera 1998), the mean concentrations of dissolved metals have typically been below the state water quality criteria for acute and chronic toxicity (Herrera 2005), and the concentrations of total and dissolved metals in the water are considered relatively low (City of Seattle 2010). Mercury is the primary metal of concern in Lake Union bottom sediments, with concentrations ranging from 0.35 to 9.18 mg/kg near certain South Lake Union discharges (City of Seattle 2010). Elevated concentrations of other pollutants also have been found in canal sediments along the north shoreline of the canal (metals, PAHs, PCBs, phthalates, and other organic compounds) (Herrera 1998; RETEC 2002).

Since 1979, water temperatures in the ship canal have increased an average of 1° Celsius (C, 1.8° F) per decade, with temperatures that can reach 20 to 22° C during the summer and early fall, and the number of days that temperatures are in that range is increasing (City of Seattle 2010). The preferred temperature limits for salmon are 13 to 18° C (55-64° F), and temperatures of 23 to 25° C (73-77° F) can be lethal. Saltwater intrusion through the locks creates a wedge of high-density saltwater that can extend into and past Lake Union during low flow periods. Freshwater typically floats over the saltwater with little mixing between the two water masses, and the saltwater wedge often becomes anoxic early in the summer as bacteria consume organics in the sediment. DO concentrations range from 9.5 to 12.6 mg/L during the winter and spring, but can decrease to as low as 1 mg/L during the summer months.

The artificial shorelines and widespread presence of overwater structures along the length of the canal and much of Lake Union provide habitat conditions that favor fish species that prey on juvenile salmonids, especially the non-native smallmouth bass. Other predators in the canal include the native northern pikeminnow and the non-native largemouth bass (Celedonia et al. 2008a and b; Tabor et al. 2004 and 2010). Tabor et al. (2004) estimated that about 3,400 smallmouth bass and 2,500 largemouth bass, large enough to consume salmon smolt (> 130 mm fork length), were in the ship canal. They also estimated that smallmouth bass consumed about 48,000 salmon smolts annually, while largemouth bass consumed about 4,200 smolts. Of those, over half were Chinook salmon smolts. Predation appeared to be highest in June, and near Portage Bay, when smolts made up approximately 50% of the diet for smallmouth bass, and about 45% for northern pikeminnow. Returning adult salmon and steelhead are often exposed to excessive predation by pinniped marine mammals (seals and sea lions) that feed on the fish that aggregate downstream of the fish ladder.

The project site is located in a highly commercial area in Salmon Bay, just upstream of the Chittenden Locks. The canal is about 380 meters wide at the site. The banks are fully armored and upland areas consist of a mix of pavement and large buildings. A description of the project site from the BA (Watershed co. 2019a) includes: “The substrate within the in-water portion of the project area is mixed fine sand and mud with aquatic vegetation (*Myriophyllum spicatum* – Eurasian watermilfoil) starting immediately waterward of the bulkhead. The current ecological functions within the proposed project area associated with the existing vegetative, hyporheic, and hydrologic conditions as they affect fish and wildlife habitat are extremely limited – typical for the highly developed and commercial areas of Lake Union and the Ship Canal. The hydrologic and hyporheic functions of the site are negated by the bulkhead that eliminates natural runoff and sediment exchange, wave energy attenuation, hyporheic support of shoreline vegetation, and large woody debris recruitment and retention. Vegetation diversity and quantity at the site is extremely limited and likely provides very little function.”

On average the ship canal passes 45,000 vessels each year, resulting in elevated ambient terrestrial and underwater noise conditions, including an acoustic deterrent system immediately downstream of the Ballard Locks, which generates 195 dB acoustic noise 24 hours a day, 365 days per year (COE 2011).

The action area provides migratory habitat for adult and juvenile PS Chinook salmon and PS steelhead, and it is located along the only route to and from marine waters for those fish and all



other anadromous salmonids in the Lake Washington and Lake Sammamish watersheds. Therefore, those fish must pass through or close to the action area twice to reproduce; first as out-migrating juveniles, then again as returning adults. The area has also been designated as critical habitat for PS Chinook salmon. The past and ongoing anthropogenic impacts described above have established conditions that maintain low current velocities, as well as salinity and temperature gradients that hinder migration of both juvenile and adult salmonids, and expose PS Chinook salmon and PS steelhead to high levels of predation.

Climate Change: Climate change has affected the environmental baseline of aquatic habitats across the region and within the action area. However, the effects of climate change have not been homogeneous across the region, nor are they likely to be in the future. During the last century, average air temperatures in the Pacific Northwest have increased by 1 to 1.4° F (0.6 to 0.8 °C), and up to 2° F (1.1 °C) in some seasons (based on average linear increase per decade; Abatzoglou et al. 2014; Kunkel et al. 2013). Recent temperatures in all but two years since 1998 ranked above the 20th century average (Mote et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10° F (1.7 to 5.6° C), with the largest increases predicted to occur in the summer (Mote et al. 2014).

Decreases in summer precipitation of as much as 30% by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2013 and 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al. 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al. 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al. 2014).

The combined effects of increasing air temperatures and decreasing spring through fall flows are expected to cause increasing stream temperatures; in 2015, this resulted in 3.5-5.3°C increases in Columbia Basin streams and a peak temperature of 26°C in the Willamette (NWFSC 2015). Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009).

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

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

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

## **2.5 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).

The proposed work window would avoid the expected peak out-migration of juveniles and return of adult PS Chinook salmon and steelhead. Adult Chinook salmon pass through Chittenden Locks between mid-June through September, with peak migration occurring in mid-August (City of Seattle 2008). Juvenile Chinook salmon outmigration through the ship canal and past the action area to the locks occurs between late-May and early-July, with the peak in June (City of Seattle 2008). Adult steelhead pass through Chittenden Locks and the Lake Washington Ship Canal between January and May, and may remain within Lake Washington through June (City of Seattle 2008). Juvenile steelhead enter Lake Washington in April, and typically migrate through the ship canal and past the action area to the locks between April and May (City of Seattle 2008).

Therefore, the proposed construction is likely to cause direct effects on PS Chinook salmon and steelhead and to the PBFs of PS Chinook salmon critical habitat through exposure to construction-related noise and degraded water quality. Indirect effects on juveniles through exposure to contaminated forage would also be likely. The applicant’s bulkhead and the adjoining parking lot would be a continuous year-round source of pollutants for the duration of its functional life which would cause effects on the listed species and the PBFs of their critical habitat through exposure to degraded water quality and contaminated forage.

### **2.5.1 Effects on Listed Species**

#### **Construction-related Elevated Noise**

Exposure to project-related pile installation noise is not likely to adversely affect PS Chinook salmon or PS steelhead because it is extremely unlikely that individuals of either species would be present within the action area during the proposed construction.

As described in the proposed action section, the project would include up to 5 days of work with a vibratory pile driver to install 15 18- by 11-inch steel H-piles. No impact proofing of the piles is proposed. Up to 15 minutes of vibratory driving would be required per pile, and a maximum of 5 piles could be installed per day. The work would be done between October 1 and April 15.

The effects of fishes' exposure to noise vary with the hearing characteristics of the exposed fish, the frequency, intensity, and duration of the exposure, and the context under which the exposure occurs. At low levels, effects may include the onset of behavioral disturbances such as acoustic masking (Codarin et al. 2009), startle responses and altered swimming (Neo et al. 2014), abandonment or avoidance of the area of acoustic effect (Mueller 1980; Picciulin et al. 2010; Sebastianutto et al. 2011; Xie et al. 2008) and increased vulnerability to predators (Simpson et al. 2016). At higher intensities and/or longer exposure durations, the effects may rise to include temporary hearing damage (a.k.a. temporary threshold shift or TTS, Scholik and Yan 2002) and increased stress (Graham and Cooke 2008). At even higher levels, exposure may lead to physical injury that can range from the onset of permanent hearing damage (a.k.a. permanent threshold shift or PTS) and mortality. The best available information about the auditory capabilities of the fish considered in this Opinion suggest that their hearing capabilities are limited to frequencies below 1,500 Hz, with peak sensitivity between about 200 and 300 Hz (Hastings and Popper 2005; Picciulin et al. 2010; Scholik and Yan 2002; Xie et al. 2008).

The NMFS uses two metrics to estimate the onset of injury for fish exposed to high intensity impulsive sounds. The metrics are based on exposure to peak sound level and sound exposure level (SEL), respectively. Both are expressed in decibels (dB). The metrics are: 1) exposure to 206 dB<sub>peak</sub>; and 2) exposure to 187 dB SEL<sub>cum</sub> for fish 2 grams or larger, or 183 dB SEL<sub>cum</sub> for fish under 2 grams. Any received level (RL) below 150 dB<sub>SEL</sub> is considered "Effective Quiet". The distance from a source where the RL drops to 150 dB<sub>SEL</sub> is considered the maximum distance from that source where fishes can be affected by the noise, regardless of accumulation of the sound energy (Stadler and Woodbury 2009). Therefore, when there is a difference between the ranges to the isopleths for effective quiet and SEL<sub>cum</sub>, the shorter range shall apply. The discussion in Stadler and Woodbury (2009) makes it clear that the thresholds likely overestimate the potential effects of exposure to impulsive sounds. Further, the assessment did not consider non-impulsive sound because it is believed to be less injurious to fish than impulsive sound. Therefore, any application of the criteria to non-impulsive sounds is also likely to overestimate the potential effects in fish. However, this assessment applies the criteria to both impulsive and non-impulsive sounds for continuity, and as a tool to gain a conservative idea of the sound energies that fish may be exposed to during the majority of this project.

The estimated in-water source levels (SL, sound level at 1 meter from the source) used in this opinion are based on the best available information, as described in the acoustic assessment done for this project (NMFS 2020), which supports the understanding that the proposed pile driving would cause injurious levels of in-water sound. Additionally, to estimate sound levels at various ranges from the source or to estimate the range at which a particular sound level would be expected, this assessment uses the standard sound attenuation equation  $RL = SL - \# \text{Log}(R)$  where  $RL$  = received level (dB),  $SL$  = source level (dB,)  $\#$  = spreading loss coefficient, and  $R$  = range in meters. Numerous acoustic measurements in shallow water environments support the use of a spreading loss coefficient of about 15 for projects like this one (CalTrans 2015). This value is considered the practical spreading loss coefficient, and was used for all sound attenuation calculations in the acoustic assessment and in this opinion.

Application of the practical spreading loss equation to the estimated SLs suggests that noise levels above the 206 dB<sub>peak</sub> threshold could extend about 28 feet (8.6 m) from pile driving work. Noise levels above the 183 and 187 dB SEL<sub>cum</sub> thresholds could theoretically extend to about 8,241 and 4,459 feet (2,511 and 1,359 m), respectively. SEL noise levels would theoretically fall to the 150 dB<sub>SEL</sub> threshold for effective quiet at 4,459 feet as well (Table 5). Therefore, any fish within 4,459 feet of the project site are likely to experience a range of impacts that would depend on their distance from the source and the duration of their exposure.

**Table 5.** Estimated maximum in-water source levels for vibratory installation of 18-inch steel H-piles with the estimated ranges to the various effects thresholds for fish.

Source	Acoustic Signature	Source Level	Threshold Range
Vibrate 18-inch Steel H-Piles 5 days, with a maximum of 75 minutes of vibratory noise/day.	< 2.5 kHz Non-Impulsive	220 dB <sub>peak</sub>	206 dB <sub>peak</sub> @ 9 m
		197 dB <sub>SEL</sub>	183 SEL <sub>CUM</sub> @ 2,511 m
		197 dB <sub>SEL</sub>	187 SEL <sub>CUM</sub> @ 1,359 m
		197dB <sub>SEL</sub>	150 dB <sub>SEL</sub> @ 1,359 m

The best available information suggests that the proposed pile driving would create fish-injurious noise levels that could extend thousands of feet from the project site. However, the project’s location, timing, and short duration of pile work, combined with the life history traits of both species in this watershed support the understanding that it is extremely unlikely that any individuals of either species would be exposed to the noise. Therefore, the noise is not likely to adversely affect either species because the likelihood of exposure is discountable.

#### Construction-related Degraded Water Quality

Exposure to construction-related water quality impacts would cause minor effects in PS Chinook and PS steelhead. Water quality at the site would be temporarily affected by pile installation, and possibly by the introduction of construction-related toxic materials that could be introduced to the water through construction-related spills and discharges, that would be contained within a full-depth sediment curtain.

Fish can uptake contaminants directly through their gills, and through dietary exposure (Karrow et al. 1999; Lee and Dobbs 1972; McCain et al. 1990; Meador et al. 2006; Neff 1982; Varanasi et al. 1993). Petroleum-based fuels, lubricants, and other fluids commonly used by construction-related equipment contain Polycyclic Aromatic Hydrocarbons (PAHs). Other contaminants can

include metals, pesticides, Polychlorinated Biphenyls (PCBs), phthalates, and other organic compounds. Depending on the pollutant, its concentration, and/or the duration of exposure, exposed fish may experience effects that can range from avoidance of an affected area, to reduced growth, altered immune function, and mortality (Brette et al. 2014; Feist et al. 2011; Gobel et al. 2007; Incardona et al. 2004, 2005, and 2006; McIntyre et al. 2012; Meadore et al. 2006; Sandahl et al. 2007; Spromberg et al. 2015).

Bloch (2010) reported on the turbidity caused by vibratory removal and installation of hollow 30-inch steel piles in Lake Washington. Turbidity reached a peak of about 25 NTU (~25 mg/L) above background levels at 50 feet from the pile, and about 5 NTU (~5 mg/L) above background at 100 feet during pile extraction. Pile installation created much lower turbidity. Turbidity returned to background levels within 30 to 40 minutes. Based on this and environmental baseline formation, the proposed pile installation is likely to mobilize very small amounts of sediments that would cause very brief and localized turbidity plumes, that may include contamination. Any PAHs and other contaminants that may be mobilized would likely be low in concentration and likely dissipate within a few hours, through a combination of evaporation at the surface, dilution in the water column (Smith 2008; Werme et al. 2010), and by settling out of the water with the sediments.

Any construction-related discharges are expected to be very infrequent, very small, and have very short in-water residence times. The project includes BMPs to reduce the risk and intensity of construction-related discharges, as well as required measures to capture and remove toxic materials that may enter the water. In the unlikely event of a construction-related spill or discharge, the amount of material released would likely be very small. Further, most of the petroleum-based fuels and lubricants that are used for this type of work typically float on the surface, so their residence time in the water column would likely be measured in minutes. While at the surface, the petroleum-based fluids would be restricted to small enclosed areas immediately around the work area, and quickly removed from the water by absorbent pads.

Based on the available information, construction-related turbidity and contaminants would be infrequent, short-lived, at very low concentrations, and fully contained within a full-depth sediment curtain during a work window when it is extremely unlikely that any individuals of either species would be present in the action area, making it extremely unlikely that any individuals of either species would be exposed to construction-related water quality impacts. Further, in the unlikely event of fish exposure, the in-water concentrations would likely be too low, and the exposure too brief to cause any detectable effects on the fitness or normal behaviors of an exposed individual. Therefore, it is discountable that construction-related water quality impacts would adversely affect either species.

#### Structure-related Degraded Water Quality

Structure-related impacts on water quality is likely to adversely affect PS Chinook salmon and PS steelhead. The repaired bulkhead would retain a large amount of creosote-treated wood. The applicant reports that the bulkhead was constructed using creosote-treated piles and timbers. Similarly, applicant reports that the bulkhead supports the adjacent parking area that discharges its stormwater runoff to the canal.

Unlike the small-scale and brief introduction of pollutants that could occur during construction, the applicant's bulkhead would be a continuous source of creosote-related pollutants for the duration of its functional life. Similarly, stormwater from the 3,000 sq ft parking area would be a year-round source of vehicle-related contaminants and other pollutants that would accumulate on its surface for the duration of its functional life (Lye 2009; McIntyre et al. 2015; McQueen et al. 2010; Peter et al. 2018; Spromberg et al. 2015)

As described earlier, fish can absorb PAHs and other contaminants directly through their gills. The salmonids that are exposed to bulkhead- and parking area-related pollutants would experience effects that would range from no detectable effects, through avoidance of the affected area, to reduced growth, altered immune function, and mortality, depending largely on the concentration, and/or the duration of exposure. The in-water concentrations and the durations of exposure any individual fish may experience due to the retention of the applicant's bulkhead and parking area, along with the intensity of the resulting effects, are unquantifiable with any degree of certainty. However, over the life of the applicant's bulkhead, some juvenile Chinook salmon and steelhead are reasonably likely to be exposed to in-water PAHs and other contaminants at concentrations high enough to measurably reduce their fitness or alter their normal behaviors.

The annual numbers of juvenile PS Chinook salmon and PS steelhead that may be impacted by structure-related degraded water quality is unquantifiable with any degree of certainty, as is the intensity of the effects that an exposed individual may experience. However, the relatively small affected area suggests that the probability of exposure would be very low for any individual fish. Therefore, for both species, the numbers of fish that may be annually exposed to degraded water quality would likely comprise extremely small subsets of the cohorts from their respective populations, and the numbers of exposed fish would be too low to cause detectable population-level effects.

#### Contaminated Forage

Exposure to contaminated forage is likely to adversely affect PS Chinook salmon and PS steelhead. Contaminants such as PAHs and PCBs would be biologically available at the site into the foreseeable future due to the continuous input of pollutants from the creosote-treated wood and parking area stormwater runoff discussed above.

Bulkhead- and parking area-related stormwater contaminants that settle to the bottom would accumulate in the action area and be biologically available for years (Romberg 2005). Amphipods and copepods uptake PAHs and other contaminants from contaminated sediments and pass them to juvenile Chinook salmon and other fish through the food web (Landrum and Scavia 1983; Landrum et al. 1984; Neff 1982). Varanasi et al. (1993) found high levels of PAHs in the stomach contents of juvenile Chinook salmon in a contaminated waterway (Duwamish). They also reported reduced growth, suppressed immune competence, as well as increased mortality in juvenile Chinook salmon that was likely caused by the dietary exposure to PAHs. Meador et al. (2006) demonstrated that dietary exposure to PAHs caused "toxicant-induced starvation" with reduced growth and reduced lipid stores in juvenile Chinook salmon. The authors surmised that these impacts could severely impact the odds of survival in affected juvenile Chinook salmon. Juvenile PS steelhead were not specifically addressed in the available

literature, but it is reasonable to expect that they may be similarly affected by dietary uptake of contaminants.

The annual number of juvenile PS Chinook salmon and PS steelhead that may be exposed to contaminated forage that would be attributable to this action is unquantifiable with any degree of certainty, as is the amount of contaminated prey that any individual fish may consume, or the intensity of any effects that an exposed individual may experience. However, the small affected area suggests that the probability of trophic connectivity to the contamination would be very low for any individual fish. Therefore, for both species, the numbers of fish that may be annually exposed to contaminated prey would likely comprise extremely small subsets of the cohorts from their respective populations, and the numbers of exposed fish would be too low to cause detectable population-level effects.

### **2.5.2 Effects on Critical Habitat**

This assessment considers the intensity of expected effects in terms of the change they would cause in affected Primary Biological Features (PBFs) from their baseline conditions, and the severity of each effect, considered in terms of the time required to recover from the effect. Ephemeral effects are those that are likely to last for hours or days, short-term effects would likely last for weeks, and long-term effects are likely to last for months, years or decades.

Puget Sound Chinook Salmon Critical Habitat: The proposed action, including full application of the planned conservation measures and BMPs, is likely to adversely affect designated critical habitat for PS Chinook salmon as described below.

1. Freshwater spawning sites – None in the action area.
2. Freshwater rearing sites – None in the action area.
3. Estuarine areas free of obstruction and excessive predation:
  - a. Obstruction and excessive predation – The proposed project would cause no effect on this attribute.
  - b. Water quantity – The proposed project would cause no effect on this attribute.
  - c. Water quality – The proposed action would cause long-term effects on this attribute. Construction would cause short-term minor effects on water quality. However, the retention of creosote-treated piles and timbers would maintain a long-standing input of PAHs and the associated parking area would contribute vehicular-related contaminants through spills and discharges. The action would cause no measurable changes in water temperature or salinity.
  - d. Natural Cover – The proposed action would cause long-term effects on this attribute. Extending the life of the bulkhead would maintain previously altered habitat conditions at the site which acts to greatly limit the availability of natural cover in the action area. Extending the life of the bulkhead would maintain the limited ecological function in the proposed project area. The bulkhead eliminates natural runoff and sediment exchange, wave energy attenuation, hyporheic support of shoreline vegetation, and large woody debris recruitment and retention.

4. Estuarine areas – None in the action area.
5. Nearshore marine areas – None in the action area.
6. Offshore marine areas – None in the action area.

## **2.6 Cumulative Effects**

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

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

The current condition of ESA-listed species and designated critical habitat within the action area are described in the Status of the Species and Critical Habitat and the Environmental Baseline sections above. The contribution of non-federal activities to those conditions include past and on-going bankside development, vessel activities, and upland urbanization in and around the action area, as well as upstream forest management, agriculture, urbanization, road construction, water development, and restoration activities. Those actions were driven by a combination of economic conditions that characterized traditional natural resource-based industries, general resource demands associated with settlement of local and regional population centers, and the efforts of conservation groups dedicated to restoration and use of natural amenities, such as cultural inspiration and recreational experiences.

NMFS is unaware of any specific future non-federal activities that are reasonably certain to affect the action area. However, the NMFS is reasonably certain that future non-federal actions such as the previously mentioned shoreline and upstream activities are all likely to continue and increase in the future as the human population continues to grow across the region. Continued habitat loss and degradation of water quality from development and chronic low-level inputs of non-point source pollutants will likely continue into the future. Recreational and commercial use of the waters within the action area are also likely to increase as the human population grows.

The intensity of these influences depends on many social and economic factors, and therefore is difficult to predict. Further, the adoption of more environmentally acceptable practices and standards may gradually reduce some negative environmental impacts over time. Interest in restoration activities has increased as environmental awareness rises among the public. State, tribal, and local governments have developed plans and initiatives to benefit ESA-listed PS Chinook salmon and PS steelhead within many of the watersheds that flow into the action area.



However, the implementation of plans, initiatives, and specific restoration projects are often subject to political, legislative, and fiscal challenges that increase the uncertainty of their success.

## **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.

As described in more detail above in Section 2.4, climate change is likely to increasingly affect the abundance and distribution of the ESA-listed species considered in the Opinion. It is also likely to increasingly affect the PBF of designated critical habitats. The exact effects of climate change are both uncertain, and unlikely to be spatially homogeneous. However, climate change is reasonably likely to cause reduced instream flows in some systems, and may impact water quality through elevated in-stream water temperatures and reduced dissolved oxygen, as well as by causing more frequent and more intense flooding events.

Climate change may also impact coastal waters through elevated surface water temperature, increased and variable acidity, increasing storm frequency and magnitude, and rising sea levels. The adaptive ability of listed-species is uncertain, but is likely reduced due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. The proposed action will cause direct and indirect effects on the ESA-listed species and critical habitats considered in the Opinion well into the foreseeable future. However, the action's effects on water quality, substrate, and the biological environment are expected to be of such a small scale that no detectable effects on ESA-listed species or critical habitat through synergistic interactions with the impacts of climate change are expected.

### **2.7.1 ESA-listed Species**

PS Chinook salmon and PS steelhead are both listed as threatened, based on declines from historic levels of abundance and productivity, loss of spatial structure and diversity, and an array of limiting factors as a baseline habitat condition. Both species will be affected over time by cumulative effects, some positive – as recovery plan implementation and regulatory revisions increase habitat protections and restoration, and some negative – as climate change and unregulated or difficult to regulate sources of environmental degradation persist or increase. Overall, to the degree that habitat trends are negative, as described below, effects on viability parameters of each species are also likely to be negative. In this context we consider the effects of the proposed action's effect on individuals of the listed species at the population scale.

## PS Chinook salmon

The long-term abundance trend of the PS Chinook salmon ESU is slightly negative, and the South Puget Sound MPG, which includes the Cedar River and North Lake Washington / Sammamish River PS Chinook salmon populations, is considered at high risk of extinction due to low abundance and productivity. Reduced or eliminated accessibility to historically important habitat, combined with degraded conditions in available habitat due to land use activities appear to be the greatest threats to the recovery of PS Chinook salmon. Commercial and recreational fisheries also continue to impact this species.

The PS Chinook salmon that occur in the action area would be fall-run Chinook salmon from the Cedar River and/or the North Lake Washington/Sammamish River populations. Abundance in both populations is relatively low, with a total annual abundances fluctuating between less than 100 and about 2,500 individuals since 1965, and slightly negative average abundance trends.

The project site is located along the Lake Washington Ship Canal, which provides the only route to and from marine waters for adult and juvenile PS Chinook salmon from the affected populations. The environmental baseline within the action area has been degraded by the effects of intense streambank and shoreline development and by maritime activities. The baseline has also been degraded by nearby and upstream industry, urbanization, agriculture, forestry, water diversion, and road building and maintenance.

The timing of project-related work would effectively avoid the presence of juvenile and adult Chinook salmon. However, over the next several decades, out-migrating juveniles that pass close to the project site are likely to be exposed to structure-related reduced water quality and contaminated forage as a result of this action. These stressors, both individually and collectively, are likely to cause a range of effects that would include some combination of altered behaviors, reduced fitness, and mortality in exposed individuals. However, the number of individuals that are likely to be impacted by action-related stressors would be extremely low.

Based on the best available information, the scale of the direct and indirect effects of the proposed action, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, would be too small to cause detectable effects on any of the characteristics of a viable salmon population (abundance, productivity, distribution, or genetic diversity) for the affected PS Chinook salmon populations. Therefore, the proposed action would not appreciably reduce the likelihood of survival and recovery of this listed species.

## PS Steelhead

The long-term abundance trends have been predominantly negative or flat across the PS steelhead DPS, especially for natural spawners. Growth rates are currently declining at 3 to 10% annually for all but a few DIPs. The extinction risk for most DIPs is estimated to be moderate to high, and the DPS is currently considered “not viable”. Reduced or eliminated accessibility to historically important habitat, combined with degraded conditions in available habitat due to land use activities appear to be the greatest threats to the recovery of PS steelhead. Fisheries activities also continue to impact this species.

The PS steelhead that occur in the action area would be winter-run fish from the Cedar River and North Lake Washington / Lake Sammamish DPSs. The abundance trends between 1984 and 2016 was strongly negative for both DIPs, and ten or fewer adult natural-spawners are estimated to return to the DPSs annually.

The project site is located along the Lake Washington Ship Canal, which provides the only route to and from marine waters for adult and juvenile PS steelhead from the affected DIPs. The environmental baseline within the action area has been degraded by the effects of intense streambank and shoreline development and by maritime activities. The baseline has also been degraded by nearby and upstream industry, urbanization, agriculture, forestry, water diversion, and road building and maintenance.

Project-related work is expected to cause no more than minor effects in exposed individuals. However, over the next several decades, out-migrating juveniles that pass close to the project site are likely to be exposed to structure-related reduced water quality and contaminated forage as a result of this action. These stressors, both individually and collectively, are likely to cause a range of effects that would include some combination of altered behaviors, reduced fitness, and mortality in exposed individuals. However, the number of individuals that are likely to be impacted by action-related stressors would be extremely low.

Based on the best available information, the scale of the direct and indirect effects of the proposed action, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, would be too small to cause detectable effects on any of the characteristics of a viable salmon population (abundance, productivity, distribution, or genetic diversity) for the affected PS steelhead DIPs. Therefore, the proposed action would not appreciably reduce the likelihood of survival and recovery of this listed species.

### **2.7.2 Critical Habitat**

As described above at Section 2.5, the proposed action is likely to adversely affect designated critical habitat for PS Chinook salmon.

#### **Chinook salmon critical habitat**

Past and ongoing land and water use practices have degraded salmonid critical habitat throughout the Puget Sound basin. Hydropower and water management activities have reduced or eliminated access to significant portions of historic spawning habitat. Timber harvests, agriculture, industry, urbanization, and shoreline development have adversely altered floodplain and stream morphology in many watersheds, diminished the availability and quality of estuarine and nearshore marine habitats, and reduced water quality across the region. Global climate change is expected to increase in-stream water temperatures and alter stream flows, possibly exacerbating impacts on baseline conditions in freshwater habitats across the region. Rising sea levels are expected to increase coastal erosion and alter the composition of nearshore habitats, which could further reduce the availability and quality of estuarine habitats. Increased ocean acidification may also reduce the quality of estuarine habitats.

In the future, non-federal land and water use practices and climate change are likely to increase. The intensity of those influences on salmonid critical habitat is uncertain, as is the degree to which those impacts may be tempered by adoption of more environmentally acceptable land use practices, by the implementation of non-federal plans that are intended to benefit salmonids, and by efforts to address the effects of climate change.

The PBF for PS Chinook salmon critical habitat in the action area is limited to freshwater migration corridors free of obstruction and excessive predation. The site attributes of that PBF that would be affected by the action are water quality and natural cover. As described above, the project site is located along a heavily impacted waterway, and both of these site attributes currently function at greatly reduced levels as compared to undisturbed freshwater migratory corridors. The long-term presence of the applicant's bulkhead would cause long term effects on the two site attributes identified above.

Based on the best available information, the scale of the proposed action's effects, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, would be too small to cause any detectable long-term negative changes in the quality or functionality of the freshwater migration corridors PBF in the action area. Therefore, this critical habitat will maintain its current level of functionality, and retain its current ability for PBFs to become functionally established, to serve the intended conservation role for PS Chinook salmon.

## **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 the NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of PS Chinook salmon and PS steelhead, nor is it likely to destroy or adversely modify designated critical habitat for PS Chinook salmon.

## **2.9 Incidental Take Statement**

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is 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 incidental take statement (ITS).

### **2.9.1 Incidental Take Statement**

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Harm of PS Chinook salmon from exposure to:

- contaminated forage,
- structure-related degraded water quality.

Harm of PS steelhead from exposure to:

- contaminated forage,
- structure-related degraded water quality.

The distribution and abundance of the fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can the NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Therefore, the NMFS cannot predict with meaningful accuracy the number of PS Chinook salmon and PS steelhead that are reasonably certain to be injured or killed by exposure to the stressor identified above. Additionally, the NMFS knows of no device or practicable technique that would yield reliable counts of individuals that may experience these impacts. In such circumstances, the NMFS uses the causal link established between the activity and the likely extent and duration of changes in habitat conditions to describe the extent of take as a numerical level of habitat disturbance. The most appropriate surrogates for take are action-related parameters that are directly related to the magnitude of the expected take.

The size and configuration of the applicant's bulkhead repair and of the adjacent parking area are the best available surrogates for the extent of take of juvenile PS Chinook salmon and PS steelhead from exposure to contaminated forage and to structure-related degraded water quality, despite the low density and random distribution of these fish in the action area. This is because both surrogates are positively correlated with the amount of the pollution generating surfaces that would be present at the site. Any increase in the amount of the pollution generating surfaces would increase in the amount of contaminants that enter the canal. As the amount of contaminants increases, the concentration of water-borne contaminants would increase, as would the number of contaminated prey organisms and/or the intensity of their contamination. As either of those measures increase, the number of juvenile PS Chinook salmon and PS steelhead that would be exposed and/or the intensity of the effects of exposure would increase.

In summary, the extent of PS Chinook salmon and PS steelhead take for this action is defined as:

- The size and configuration of the repaired bulkhead as described in the proposed action section of this biological opinion; and
- The size and configuration of the adjacent parking area as described in the proposed action section of this biological opinion.

Exceedance of any of the exposure limits described above would constitute an exceedance of authorized take that would trigger the need to reinitiate consultation.

Although these take surrogates could be construed as partially coextensive with the proposed action, they nevertheless function as effective reinitiation triggers. If the size and configuration of the structure exceeds the proposal, it could still meaningfully trigger reinitiation because the Corps has authority to conduct compliance inspections and to take actions to address non-compliance, including post-construction (33 CFR 326.4).

### **2.9.2 Effect of the Take**

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

### **2.9.3 Reasonable and Prudent Measures**

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

The COE shall require the applicant to:

1. Ensure the implementation of monitoring and reporting to confirm that the take exemption for the proposed action is not exceeded.

### **2.9.4 Terms and Conditions**

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

1. The following terms and conditions implement reasonable and prudent measure 1:
  - a. The COE shall require the applicant to develop and implement plans to collect and report details about the take of listed fish. That plan shall:
    - i. Require the contractor to maintain and submit records to verify that all take indicators are monitored and reported. Minimally, the records should include:

1. Documentation of the timing and duration of in-water work to ensure that it is accomplished between October 1 and April 15;
  2. Descriptions of all in-water work, pile installation;
  3. Documentation of the type, size, and number of piles installed;
  4. Documentation of the method of pile installation; and
  5. Documentation of the final dimensions of the repaired bulkhead to confirm that it does not exceed the dimensions and/or characteristics described in this opinion.
- ii. Require the applicant to establish procedures for the submission of the construction records and other materials to the appropriate COE office; and
  - iii. Require the COE to submit an electronic post-construction report to the NMFS within six months of project completion. Send the report to: [projectreports.wcr@noaa.gov](mailto:projectreports.wcr@noaa.gov). Be sure to include Attn: WCRO-2019-04045 in the subject line.

## **2.10 Conservation Recommendations**

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

1. To minimize adverse effects on water quality, the COE should encourage the applicant to develop a long-term plan that includes:
  - a. Replacement and/or full encapsulation of all creosote-treated timber; and
  - b. Installation of a filtration treatment system for the stormwater that is discharged from the parking area.

## **2.11 Reinitiation of Consultation**

This concludes formal consultation for the U.S. Army Corps of Engineers' authorization of the Stimson Marina Bulkhead repair project, King County, Washington.

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and 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. MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE**

Section 305(b) of the MSA directs Federal agencies to consult with the NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires the NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

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

#### **3.1 Essential Fish Habitat Affected By the Project**

The project site is located in Seattle, along the northern shore of the Lake Washington Ship Canal (Figure 1). The waters and substrate of the Lake Washington Ship Canal are designated as freshwater EFH for various life-history stages of Pacific Coast Salmon, which within the Lake Washington watershed include Chinook and coho salmon. Freshwater EFH for Pacific salmon is identified and described in Appendix A to the Pacific Coast salmon fishery management plan, and consists of four major components: (1) spawning and incubation; (2) juvenile rearing; (3) juvenile migration corridors; and (4) adult migration corridors and holding habitat.

As part of Pacific Coast Salmon EFH, five Habitat Areas of Particular Concern (HAPCs) have been defined: 1) complex channels and floodplain habitats; 2) thermal refugia; 3) spawning habitat; 4) estuaries; and 5) marine and estuarine submerged aquatic vegetation. The action area provides no known HAPC habitat features.

#### **3.2 Adverse Effects on Essential Fish Habitat**

The ESA portion of this document (Sections 1 and 2) describes the proposed action and its adverse effects on ESA-listed species and critical habitat, and is relevant to the effects on EFH for Pacific Coast Salmon. Based on the analysis of effects presented in Section 2.5 the proposed action will cause minor short- and long-term adverse effects on EFH for Pacific Coast Salmon as summarized below.



1. Water quality: – The proposed action would cause minor short- and long-term adverse effects on this attribute. The action would cause no changes in water temperature and salinity, but construction would mobilize small amounts of contaminated bottom sediments. Additionally, retention of the applicant’s creosote-treated timber bulkhead and untreated stormwater from the associated parking area would maintain long-standing sources of PAHs and vehicle-related contaminants to the canal. Detectable effects would be limited to the area within about 300 feet around the bulkhead.
2. Water quantity, depth, and velocity: – No changes expected.
3. Riparian-stream-marine energy exchanges: – The proposed action would cause minor long-term adverse effects on this attribute. Extending the life of the applicant’s bulkhead would maintain long-standing conditions that greatly limit the growth of riparian vegetation and submerged aquatic vegetation (SAV) at the project site. It would also continue to eliminate natural runoff and sediment transport, wave energy attenuation, hyporheic flows, and large woody debris recruitment and retention.
4. Channel gradient and stability: – The proposed action would cause minor long-term adverse effects on this attribute. Extending the life of the applicant’s bulkhead would maintain long-standing conditions that prevent natural channel forming processes. The bulkhead would perpetuate an unnatural vertical bank with bankside water depths in excess of 10 feet instead allowing the formation of a gently sloped bank with shoreline water depths measures in inches that would be present under natural conditions.
5. Prey availability: – The proposed action would cause long-term minor adverse effects on this attribute. The bulkhead would maintain artificially deep bank-side water depths that limits SAV growth and reduces the density and diversity of the planktonic organisms such as amphipods, copepods, and larvae of many benthic species that are important prey resources for juvenile salmonids. The contaminants from the bulkhead and parking area are also likely to contaminate some of the available prey resources.
6. Cover and habitat complexity: – The proposed action would cause long-term minor adverse effects on this attribute. As described above at 3, 4, and 5, the continued presence of the bulkhead and parking area would continue to limit the growth of riparian vegetation and SAV that provide over- and in-water cover for juvenile salmonids, and the bulkhead would perpetuate simplified habitat conditions at the site that consist of an unnatural vertical bank and relatively flat mud bottom.
7. Water quantity: – No changes expected.
8. Space: – No changes expected.
9. Habitat connectivity from headwaters to the ocean: – No changes expected.

10. Groundwater-stream interactions: – The proposed action would cause minor long-term adverse effects on this attribute. Extending the life of the applicant’s bulkhead would maintain long-standing conditions that greatly limit or eliminate hyporheic flows to the canal.
11. Connectivity with terrestrial ecosystems: – No changes expected.
12. Substrate composition: – No changes expected.

### **3.3 Essential Fish Habitat Conservation Recommendations**

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

1. To minimize adverse effects on water quality, the COE should encourage the applicant to develop a long-term plan that includes:
  - a. Replacement and/or full encapsulation of all creosote-treated timber; and
  - b. Installation of a filtration treatment system for the stormwater that is discharged from the parking area.

Full implementation of this EFH conservation recommendation would protect, by avoiding or minimizing adverse effects on water quality described in section 3.2, above, for Pacific Coast salmon.

The NMFS knows of no practical measures that are available to address the action’s impacts on riparian-stream-marine energy exchanges, channel gradient and stability, prey availability, cover and habitat complexity, habitat connectivity from headwaters to the ocean.

### **3.4 Statutory Response Requirement**

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

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

portion of this consultation, you clearly identify the number of conservation recommendations accepted.

### **3.5 Supplemental Consultation**

The COE must reinitiate EFH consultation with the NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(1)).

## **4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW**

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

### **Utility**

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the COE. Other interested users could include Stimson Marina, WDFW, the governments and citizens of King County and the City of Seattle, and Native American tribes. Individual copies of this opinion were provided to the COE. The document will be available within two weeks at the NOAA Library Institutional Repository [<https://repository.library.noaa.gov/welcome>]. The format and naming adheres to conventional standards for style.

### **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.

### **Objectivity**

***Information Product Category:*** Natural Resource Plan

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

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

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

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

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