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-2021-00698

July 8, 2021

Michelle Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers Seattle District
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 Port of Tacoma Blair Waterway Berth Maintenance Dredging Washington United Terminal and Husky Terminal Project, Tacoma, Pierce County, Washington (HUC 171100190204) (NWS-2020-1017-WRDA)

Dear Ms. Walker:

Thank you for your letter of March 30, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for Blair Waterway Berth Maintenance Dredging – Washington Unites Terminal and Husky Terminal, Port of Tacoma (NWS-2020-1017-WRDA). This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

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

In the attached biological opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*), PS steelhead (*Oncorhynchus mykiss*), PS/Georgia Basin bocaccio rockfish (*Sebastes paucispinis*), yelloweye rockfish (*Sebastes ruberrimus*), humpback whales (*Megaptera novaeangliae*), Southern Resident killer whales (*Orcinus orca*), or result in the destruction or adverse modification of designated critical habitats.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

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.

If the response is inconsistent with the EFH conservation recommendations, the Corps must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations.

Please contact Caitlin Imaki, of the Oregon Washington Coastal Office in Lacey, Washington, at caitlin.imaki@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

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

cc: Jacalen Printz, USACE

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

Port of Tacoma Blair Waterway Berth Maintenance Dredging
Washington United Terminal and Husky Terminal Project
Tacoma, Pierce County, Washington
(HUC 171100190204) (NWS-2020-1017-WRDA)

NMFS Consultation Number: WCRO-2021-00698

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

Affected Species and NMFS' Determinations:

ESA-Listed Species	ESA Status	Is the action likely to adversely affect the species?	Is the action likely to adversely affect the critical habitat?	Is the action likely to jeopardize the species?	Is the action likely to destroy or adversely modify critical habitat?
Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)	T	Yes	Yes	No	No
Puget Sound Steelhead(*O. mykiss*)	T	Yes	Yes	No	No
Puget Sound/Georgia Basin boccacio rockfish (*Sebastes. paucispinis*)	E	No	NA	NA	NA
Puget Sound/Georgia Basin yelloweye rockfish (*S. ruberrimus*)	T	No	NA	NA	NA
Humpback whale, Central America DPS (*Megaptera novaeangliae*)	E	No	NA	NA	NA
Humpback whale, Mexico DPS (*Megaptera novaeangliae*)	T	No	NA	NA	NA
Southern Resident Killer Whale (*Orcinus orca*)	T	No	NA	NA	NA

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes
Pacific Coast Groundfish	Yes	No
Coastal Pelagics	Yes	No

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: July 8, 2021

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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 U.S.C. 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 the Oregon Washington Coastal Office in Lacey, Washington.

1.2 Consultation History

On March 20, 2021, NMFS received a request for informal consultation from the Seattle District, United States Army Corps of Engineers (USACE) on its proposal to authorize dredging by the Port of Tacoma, under its Section 404 Clean Water Act authority.

On April 21, 2021, NMFS received a change in request to formal consultation. Included in this request were a biological evaluation, and supplemental information from the applicant, Port of Tacoma, and their agent, Leon Environmental, LLC.

On April 26, 2021, after initial review of the consultation package by NMFS, and we determined it to be complete, and NMFS initiated formal consultation. NMFS evaluated the effects on seven listed species and determined five of the species and their designated critical habitat are not likely to be adversely affected. Species likely to be adversely affected are Puget Sound Chinook, and Puget Sound steelhead, and the effects are evaluated in the biological opinion. The basis for our determination on the remaining five species is presented in a separate section of the document.

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). Under 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 USACE proposes to issue a permit under Section 404 of the Clean Water Act to the Port of Tacoma for a Blair Waterway Maintenance Dredging project. The Port intends to restore previously dredged depths (-51 feet MLLW) at two locations within Blair Waterway, Tacoma, Washington: Washington United Terminal (WUT) and Husky Terminal (Husky; Figure 1). Both locations are subtidal areas used to berth ships for the transfer of cargo into or out of the Port of Tacoma. At these two specific sites, sediment has accumulated and is interfering with safe navigation.

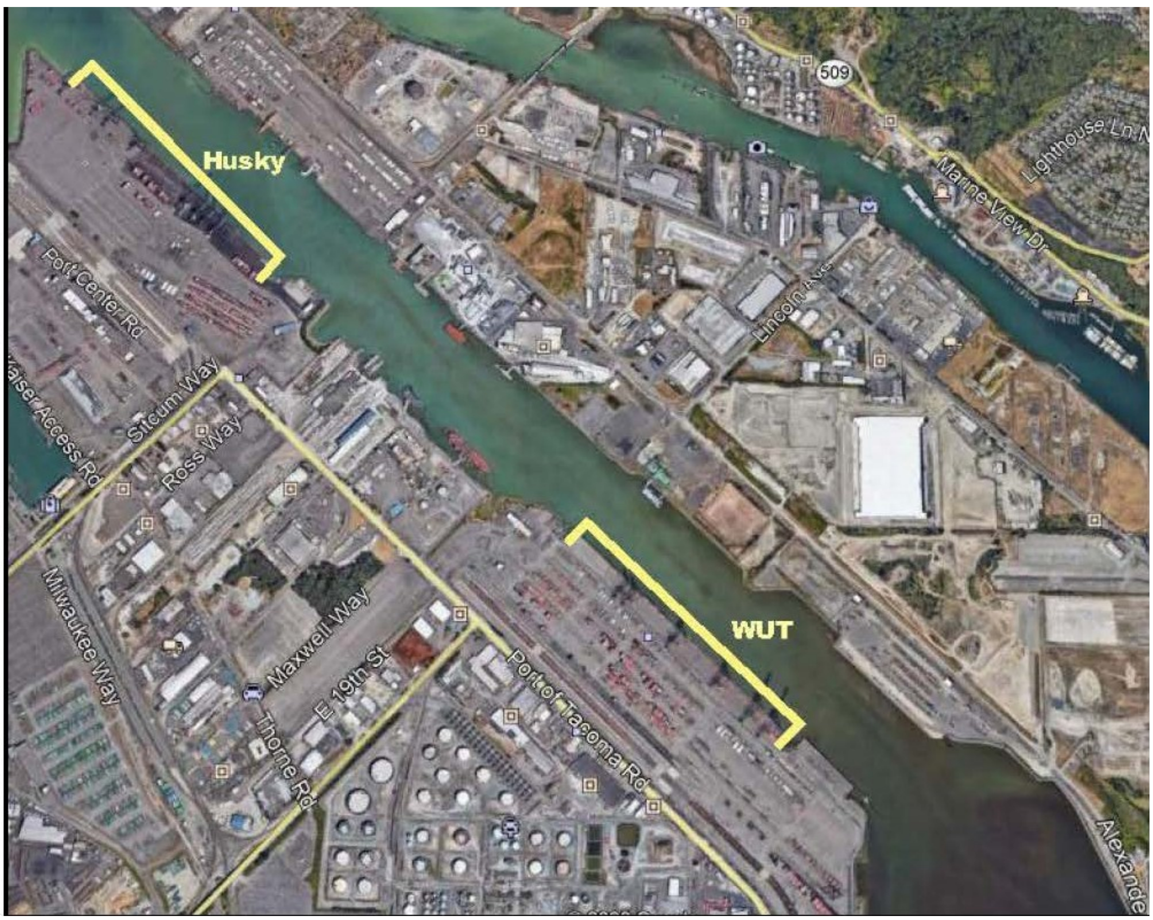

Figure 1. Location of dredging reaches (yellow for the 150-ft estimated maximum extent of effects outside of the dredging areas) at Husky and WUT terminals in Blair Waterway.

The Port intends to dispose of the dredged material at the Commencement Bay open-water disposal site, which is managed under the Dredge Material Management Program (DMMP[1]). The DMMP agencies have conclude that all of the material from Husky and WUT is suitable for

[1] https://www.nws.usace.army.mil/Missions/Civil-Works/Dredging/.

open-water disposal at Commencement Bay, as long as they are dredged together during the same dredge event (Blair Waterway SDM, 2021). The effects of sediment disposal at DMMP open-water disposal sites have already been considered in the programmatic formal consultation for their continued use through 2040 (NMFS 2015a), and as such, the use of DMMP open-water disposal sites for disposal of sediments are not evaluated as a part of the proposed action.

The Port is requesting to dredge an estimated area of 233,100 square feet (total volume of 27,000 cubic yards) from the two terminals to restore the authorized depth of -51 ft MLLW at each terminal, including a 1-ft over dredge (approximately 9,000 cy). The total volume proposed to be dredged from each terminal, including potential over dredge, is summarized in Table 1, below.

Table 1. Port of Tacoma Blair Waterway Project Dredged Material Volumes

Terminal	Authorized Depth (ft MLLW)	Proposed Dredge Volumes		Total Volume (cy)	Square feet (sf)
		Authorized Depth (cy)	**1-ft Over Dredge (cy)**		
Husky	-51	5,830	2,250	8,080	60,800
WUT	-51	12,440	6,370	18,810	172,300
	Total	**18,270**	**8,620**	**26,890**	**233,100**

The Port proposes to conduct dredging using a crane or excavator-operated clamshell bucket, however, hydraulic dredging (suction dredging) may also be selected by the contractor. Each dredging cycle will involve a single "bite" by the clamshell bucket. When the clamshell bucket hits the seafloor, it will fully close and be slowly raised through the water column to the surface for placement onto a barge for transportation to the open water disposal site. Dredging operations are expected to occur approximately 1 to 2 weeks at each location. No other activity is included with the proposed maintenance dredging action.

Minimization measures and best management practices proposed by the applicant and described in the biological evaluation submitted by Port of Tacoma and its consultant, are considered parts of the proposed action to minimize adverse effects to ESA-listed species and their designated critical habitats. These measures and practices include the following:

- Dredging actions will be conducted during the Washington Department of Fish and Wildlife (WDFW)-approved in-water work window for Commencement Bay (July 16 – February 14), and will be conducted during standard daylight working hours.
- Upon advance notice, the Port will provide access to the work site to representatives from USACE, the Federal Services, Ecology and WDFW during all hours when the proposed action is being conducted.
- No new upland construction will occur as part of the proposed action.
- Work dredging will occur well below MHHW. No additional or new habitat conversion will occur. There will be no dredging in intertidal or subtidal habitat. No intertidal or shallow subtidal habitat will be converted to deep subtidal. Dredging will remove targeted high-spots to maintain berthing areas at previously authorized and dredged depths.
- No dredging will occur in sand lance, surf smelt, or herring spawning beds.
- No dredging will occur in areas with seagrass or kelp.

- The Port will request the contractor utilize real-time positioning control during dredging operations to minimize over dredging.

A suite of best management practices (BMPs) will be employed to minimize sediment loss and turbidity generation during dredging and dewatering, including but not limited to the following:

- Elimination of multiple bites while the dredge bucket is on the bottom
- No stockpiling of dredge material below the ordinary high water line
- Use of spill plates or equivalent controls during transloading
- Slowing the velocity (i.e., cycle time) of the ascending loaded clamshell bucket through the water column
- Pausing the dredge bucket near the bottom while descending and near the water line while ascending
- The barge will be managed such that the dredged sediment load does not exceed the capacity of the barge. The load will be placed in the barge to maintain an even keel and avoid listing. Hay bales or filter fabric will be placed over the barge scuppers to filter suspended sediment from the return water.
- The barge used to transport dredged material to the disposal site will have tightly sealing doors and compartments and have minimal leakage during transit.
- No maintenance dredging will be performed in or within 25 ft of an existing or previously designated Washington State Model Toxics Control Act (MTCA) site.
- All work will occur from barges moored at the two terminals. Barges will be moored over subtidal substrate avoiding grounding. No vegetated shallows exist within the vicinity of the proposed maintenance dredging locations.
- A written spill prevention, control and countermeasures (SPCC) plan will be prepared by the contractor for activities that include the use of heavy equipment. The plan will describe measures to prevent or reduce impacts from accidental leaks or spills, and will describe all hazardous materials that will be used, their proper storage and handling, and the methods that will be used to monitor their use. A spill kit will be available on-site during construction and stored in a location that facilitates immediate deployment, if needed.
- No solvents or other chemicals will be used in or over the water during the operation of the proposed action.
- An oil-absorbing floating boom, appropriate for the size of the work area, will be available on-site whenever dredging equipment is operated. The boom will be stored in a location that facilitates its immediate deployment in the event of a spill.

The proposed action includes all dredging operations, moving and handling of the dredged material, and open-water disposal of that material. Because the purpose of this dredge is to accommodate current vessels rather than to increase vessel use, we determined there are no new longer-term activities that would directly or indirectly affect ESA-listed species that would be considered actions caused by the proposed action, and we have not included any actions other than those described above in our ESA or EFH analyses. Effects of existing vessel use of the Blair Waterway are part of the environmental baseline, and are presented in that portion of the biological opinion that presents the baseline. No element of the action as we understand it will cause additional vessel-related effects at this location.

1.4 Action Area

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

The action area is determined by the greatest extent of physical, chemical, and biological effects stemming from the project. For the proposed action, there is short-term construction- related effects. The greatest extent of physical, chemical or biological effects stemming from the proposed action is associated with proposed construction activities, in this case the area where elevated levels of turbidity from in-water work will be spread. The size of this area is estimated to be a 200-foot radius surrounding all proposed in-water activity, which is premised on suspended sediment meeting the point of compliance for aquatic life turbidity criteria set forth in the Washington State Water Quality Standards for estuarine waters (173-201A-400 Washington Administrative Code). However, the footprint of the dredged area is 233,100 square feet, and the turbidity pulses may reach up to 200 feet beyond that footprint, for a total action area 243,300 square feet (5.6 acres).

This action area is within designated critical habitat for PS Chinook, PS steelhead and is also within designated EFH for Chinook salmon and groundfish.

2. Endangered Species Act: Biological Opinion And Incidental Take Statement

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 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 Range-wide Status of the Species and Critical Habitat

This biological 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' current "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 current function of the essential PBFs that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. The largest hydrologic responses are expected to occur in basins with significant snow accumulation, where warming decreases snow pack, increases winter flows, and advances the timing of spring melt (Mote et al. 2014; Mote et al 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Tague et al. 2013; Mote et al. 2014).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F 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. 2014). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote et al. 2014).

Decreases in summer precipitation of as much as 30 percent 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). 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 (Mantua et al. 2010; Isaak et al. 2012). 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; Winder and Schindler 2004; Raymondi et al. 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Wainwright & Weitkamp 2013; Raymondi et al. 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 (McMahon and Hartman 1989; Lawson et al. 2004).

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7ºC by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011; Reeder et al. 2013).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. A 38 percent to 109 percent increase in acidity is projected by the end of this century in all but the most stringent CO_2 mitigation scenarios, and is essentially irreversible over a time scale of centuries (IPCC 2014). Regional factors appear to be amplifying acidification in Northwest ocean waters, which is occurring earlier and more acutely than in other regions and is already impacting important local marine species (Barton et al. 2012; Feely et al. 2012). Acidification also affects sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely et al. 2012; Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011; Reeder et al. 2013). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005; Zabel et al. 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011; Reeder et al. 2013).

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.

2.2.1 Status of ESA-Listed Fish Species

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

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

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

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

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

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

Status of PS Chinook Salmon

The Puget Sound 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 (Shared Strategy for Puget Sound 2007) and a supplement by 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 the viability criteria for all VSP parameters are sustained to provide ecological functions and preserve options for ESU recovery.

<u>Spatial Structure and Diversit</u>y. The Puget 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 (MPG), that are based on similarities in hydrographic, biogeographic, and geologic characteristics.

Between 1990 and 2014, the proportion of natural-origin spawners has trended downward across the ESU, with the Whidbey Basin the only MPG with consistently high fractions of natural-origin spawner abundance. All other MPG have either variable or declining spawning populations with high proportions of hatchery-origin spawners (NWFSC 2015). Overall, the new information on abundance, productivity, spatial structure and diversity since the 2010 status review supports no change in the biological risk category (NWFSC 2015; NMFS, 2017).

<u>Abundance and Productivity</u>. Available data on total abundance since 1980 indicate that although abundance trends have fluctuated between positive and negative for individual

populations, there are widespread negative trends in natural-origin Chinook salmon spawner abundance across the ESU (NWFSC 2015). 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 shows that most populations have declined in abundance over the past 7 to 10 years. Further, escapement levels for all populations remain well below the TRT planning ranges for recovery, and most populations are consistently below the spawner-recruit levels identified by the TRT as consistent with recovery (NWFSC 2015; NMFS, 2017).

Limiting Factors. Limiting factors for this species 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
- Altered flow regime

Status of PS Steelhead

The PS Steelhead TRT produced viability criteria, including population viability analyses (PVAs), for 20 of 32 demographically independent populations (DIPs) and three major population groups (MPGs) in the DPS (Hard 2015). It also completed a report identifying historical populations of the DPS (Myers et al. 2015). The DIPs are based on genetic, environmental, and life history characteristics. Populations display winter, summer, or summer/winter run timing (Myers et al. 2015). The TRT concludes that the DPS is currently at "very low" viability, with most of the 32 DIPs and all three MPGs at "low" viability.

The designation of the DPS as "threatened" is based upon the extinction risk of the component populations. Hard 2015, identify several criteria for the viability of the DPS, including that a minimum of 40 percent of summer-run and 40 percent of winter-run populations historically present within each of the MPGs must be considered viable using the VSP-based criteria. For a DIP to be considered viable, it must have at least an 85 percent probability of meeting the viability criteria, as calculated by Hard (2015).

On December 27, 2019, we published a recovery plan for PS steelhead (84 FR 71379) (NMFS 2019a). The plan indicates that within each of the three MPGs, at least fifty percent of the populations must achieve viability, *and* specific DIPs must also be viable:

Central and South Puget Sound MPG: Green River Winter-Run; Nisqually River Winter-Run; Puyallup/Carbon Rivers Winter-Run, or the White River Winter-Run; and at least one additional DIP from this MPG: Cedar River, North Lake Washington/Sammamish Tributaries, South Puget Sound Tributaries, or East Kitsap Peninsula Tributaries.

Hood Canal and Strait of Juan de Fuca MPG: Elwha River Winter/Summer-Run; Skokomish River Winter-Run; One from the remaining Hood Canal populations: West Hood Canal Tributaries WinterRun, East Hood Canal Tributaries Winter-Run, or South Hood Canal Tributaries WinterRun; and One from the remaining Strait of Juan de Fuca populations: Dungeness Winter-Run, Strait of Juan de Fuca Tributaries Winter-Run, or Sequim/Discovery Bay Tributaries Winter-Run.

North Cascades MPG: Of the eleven DIPs with winter or winter/summer runs, five must be viable: One from the Nooksack River Winter-Run; One from the Stillaguamish River Winter-Run; One from the Skagit River (either the Skagit River Summer-Run and Winter-Run or the Sauk River Summer-Run and Winter-Run); One from the Snohomish River watershed (Pilchuck, Snoqualmie, or Snohomish/Skykomish River Winter-Run); and One other winter or summer/winter run from the MPG at large.

Of the five summer-run DIPs in this MPG, three must be viable representing in each of the three major watersheds containing summer-run populations (Nooksack, Stillaguamish, Snohomish Rivers); South Fork Nooksack River Summer-Run; One DIP from the Stillaguamish River (Deer Creek Summer-Run or Canyon Creek Summer-Run); and One DIP from the Snohomish River (Tolt River Summer-Run or North Fork Skykomish River Summer-Run)

Spatial Structure and Diversity**.** The PS steelhead DPS is the anadromous form of *O. mykiss* that occur in rivers, below natural barriers to migration, in northwestern Washington State that drain to Puget Sound, Hood Canal, and the Strait of Juan de Fuca between the U.S./Canada border and the Elwha River, inclusive. The DPS also includes six hatchery stocks that are considered no more than moderately diverged from their associated natural-origin counterparts: Green River natural winter-run; Hamma Hamma winter-run; White River winter-run; Dewatto River winter-run; Duckabush River winter-run; and Elwha River native winter-run (USDC 2014).. Non-anadromous ‘‘resident’’ *O. mykiss* 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. 2007).

DIPs can include summer steelhead only, winter steelhead only, or a combination of summer and winter run timing (e.g., winter run, summer run or summer/winter run). Most DIPs have low viability criteria scores for diversity and spatial structure, largely because of extensive hatchery influence, low breeding population sizes, and freshwater habitat fragmentation or loss (Hard et al. 2007). In the Central and South Puget Sound and Hood Canal and Strait of Juan de Fuca MPGs, nearly all DIPs are not viable (Hard 2015). More information on PS steelhead spatial structure and diversity can be found in NMFS' technical report (Hard 2015).

Abundance and Productivity. Abundance of adult steelhead returning to nearly all Puget Sound rivers has fallen substantially since estimates began for many populations in the late 1970s and early 1980s. Smoothed trends in abundance indicate modest increases since 2009 for 13 of the 22 DIPs. Between the two most recent five-year periods (2005-2009 and 2010-2014), the geometric mean of estimated abundance increased by an average of 5.4 percent. For seven populations in the Northern Cascades MPG, the increase was 3 percent; for five populations in the Central & South Puget Sound MPG, the increase was 10 percent; and for six populations in the Hood Canal

& Strait of Juan de Fuca MPG, the increase was 4.5 percent. However, several of these upward trends are not statistically different from neutral, and most populations remain small. Inspection of geometric means of total spawner abundance from 2010 to 2014 indicates that 9 of 20 populations evaluated had geometric mean abundances fewer than 250 adults and 12 of 20 had fewer than 500 adults. Between the most recent two five-year periods (2005-2009 and 2010-2014), several populations showed increases in abundance between 10 and 100 percent, but about half have remained in decline. Long-term (15-year) trends in natural spawners are predominantly negative (NWFSC 2015; NMFS, 2017).

There are some signs of modest improvement in steelhead productivity since the 2011 review, at least for some populations, especially in the Hood Canal & Strait of Juan de Fuca MPG. However, these modest changes must be sustained for a longer period (at least two generations) to lend sufficient confidence to any conclusion that productivity is improving over larger scales across the DPS. Moreover, several populations are still showing dismal productivity, especially those in the Central & South Puget Sound MPG (NWFSC 2015).

Little or no data is available on summer-run populations to evaluate extinction risk or abundance trends. Because of their small population size and the complexity of monitoring fish in headwater holding areas, summer steelhead have not been broadly monitored.

Limiting factors. In our 2013 proposed rule designating critical habitat for this species (USDC 2013b), we noted that the following factors for decline for PS steelhead persist as limiting factors:

- 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

2.2.2 Status of Critical Habitat

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

Salmon and Steelhead. For salmon and steelhead, NMFS ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC_5) in terms of the conservation value they provide to each listed species they support.[2] The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, NMFS's critical habitat analytical review teams (CHARTs) evaluated the quantity and quality of habitat features (for example, spawning gravels, wood and water condition, side channels), the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area (NOAA Fisheries 2005). Thus, even a location that has poor quality of habitat could be ranked with a high conservation value if it were essential due to factors such as limited availability (*e.g*., one of a very few spawning areas), a unique contribution of the population it served (*e.g*., a population at the extreme end of geographic distribution), or if it serves another important role (*e.g*., obligate area for migration to upstream spawning areas).

The physical or biological features of freshwater spawning and incubation sites, include water flow, quality and temperature conditions and suitable substrate for spawning and incubation, as well as migratory access for adults and juveniles. These features are essential to conservation because without them the species cannot successfully spawn and produce offspring. The physical or biological features of freshwater migration corridors associated with spawning and incubation sites include water flow, quality and temperature conditions supporting larval and adult mobility, abundant prey items supporting larval feeding after yolk sac depletion, and free passage (no obstructions) for adults and juveniles. These features are essential to conservation because they allow adult fish to swim upstream to reach spawning areas and they allow larval fish to proceed downstream and reach the ocean.

Puget Sound Chinook Salmon and Steelhead

In designating critical habitat for PS Chinook and PS Steelhead in estuarine and nearshore marine areas, NMFS determined that the area from extreme high water extending out to the maximum depth of the photic zone (no greater than 30 meters relative to mean lower low water; MLLW) contain essential features that require special protection. For nearshore marine areas, NMFS designated the area inundated by extreme high tide because it encompasses habitat areas typically inundated and regularly occupied during the spring and summer when juvenile salmon are migrating in the nearshore zone and relying heavily on forage, cover, and refuge qualities provided by these occupied habitats.

All physical and biological features (or primary constituent elements) of estuarine, and nearshore marine critical habitat for the affected salmonid species and critical habitat have been degraded

[2] The conservation value of a site depends upon "(1) the importance of the populations associated with a site to the ESU [or DPS] conservation, and (2) the contribution of that site to the conservation of the population through demonstrated or potential productivity of the area" (NOAA Fisheries 2005).

throughout the PS region. The causes for these losses of critical habitat value include human development, including diking, filling of wetlands and bays, channelization, nearshore and floodplain development. The continued growth contributes to the anthropogenic modification of the PS shorelines and is the major factor in the cumulative degradation and loss of nearshore and estuarine habitat. The development of shorelines includes bank hardening and the introduction of obstructions in the nearshore, each a source of structure and shade which can interfere with juvenile salmonid migration, diminish aquatic food supply, and is a potential source of water pollution from boating uses (Shipman et al. 2010; Morley et al. 2012; Fresh et al. 2011).

Critical habitat for Puget Sound Chinook salmon (70 FR 52630, designated 9/02/2005) includes 1,683 miles of streams, 41 square miles of lakes, and 2,182 miles of nearshore marine habitat in Puget Sound. The Puget Sound Chinook salmon Evolutionarily Significant Unit (ESU) has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and 8 received a medium rating. Of the marine areas, all 19 are ranked with high conservation value. PBFs relevant for this consultation include: (1) Estuarine areas free of obstruction with water quality and aquatic vegetation to support juvenile transition and rearing; and (2) nearshore marine areas free of obstruction with water quality conditions, forage, submerged and overhanging large wood, and aquatic vegetation to support growth and maturation.

Critical habitat for Puget Sound Steelhead (81 FR 9252, designated 2/24/2016) includes 2,031 stream miles. Nearshore and offshore marine waters were not designated for this species. There are 66 watersheds within the range of this DPS. Nine watersheds received a low conservation value rating, 16 received a medium rating, and 41 received a high rating to the DPS.

The degradation of multiple aspects of PS Chinook and PS steelhead critical habitat indicates that the conservation potential of the critical habitat is not being reached, even in areas where the conservation value of habitat is ranked high.

2.3 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).

2.3.1 Habitat Conditions in the Action Area

The action area includes two highly industrialized locations within the Blair Waterway, Tacoma, Washington: Washington United Terminal (WUT) and Husky Terminal. Both locations are subtidal areas used to berth ships for the transfer of cargo into and out of the Port of Tacoma.

The site of the proposed action is a highly modified shoreline within the historic Puyallup River tideflats. The area has been highly modified by dredging of the Blair Waterway, other Commencement Bay waterways, and filling for upland port activities, and both sites are located within areas that are currently or were formerly within the Commencement Bay Nearshore/Tideflats Superfund site.

Development of Commencement Bay began in the late 19th century and has fragmented the estuarine habitats contained therein ever since (USACE et al. 1993). By 1917, several waterways—including the Blair Waterway—had been constructed by dredging and filling mudflats in the Puyallup River delta and Commencement Bay. Industrial development and altered shorelines, consisting of vertical or steeply sloping bulkheads and piers, fragmented the remaining estuarine habitat (Kerwin 1999). Historical migrations of anadromous fish into side channels and sloughs have largely been eliminated. Saltwater transitions zones, an important ecological habitat for the development of juvenile salmonids, have all but disappeared. Although not present within the action areas, chemical contamination of sediments within the bay has compromised the effectiveness of the remaining habitat (USACE et al. 1993; USFWS & NOAA 1997; Collier et al. 1998). Despite these extensive alterations to the natural habitat within Commencement Bay, some biological resources still use the remaining available habitat (USFWS & NOAA 1997).

Extensive intertidal mudflats once covered an estimated 2,100 acres of Commencement Bay. In 1992, approximately 180 acres remained (USACE et al. 1993). Dredging and other anthropogenic activity within Commencement Bay are responsible for this change in habitat. Several habitat mitigation and restoration sites have been established since the 1993 USACE report; the Port has participated in recreating and/or restoring approximately 80 additional acres of marine and estuarine habitat within the action areas since the 1993 USACE report. The majority of the remaining mudflat habitat is located near the mouth of the Puyallup River, within the Hylebos, Middle, Milwaukee, St. Paul, and Wheeler-Osgood Waterways (USACE et al. 1993; USFWS & NOAA 1997).

The Port of Tacoma is a large, integrated system. It is comprised of several waterways, berth areas, pier structures, terminal backlands, and road and rail systems. The waterways are themselves large engineered structures generally with 2:1 heavily armored slopes. These structural components all rely on each other for the system to work. No one component has much value without the others. Import cargo is brought in through a waterway to a berth area, discharged across a dock, staged in a terminal backland, and placed on a rail car to be hauled across the country or trucked to a transload facility, and distributed locally. Local import containers (those not going elsewhere) are then ideally filled with export goods. Export goods from the Pacific Northwest are generally agricultural products and machinery—both of which are heavier than most import goods.

The Blair Waterway is a permanent component of this integrated system. The Blair Waterway was first constructed prior to 1920 by private interests. Over the last 100 years, at least 14 different dredge/cleanup projects have shaped the waterway to its current configuration. It has been at its current length since the mid-1960s. In the last 25 years, there have been several deepening actions, some conducted as part of the Commencement Bay Nearshore/Tideflats

(CB/NT) Superfund cleanup; at least five different cutback actions for widening the waterway; bridge abutment fill removal; slip fills; and pier realignments. During this same 25-year period, there have been numerous pier redevelopments, realignments, expansions, and new construction.

The Blair Waterway has a long history as an integral structure to support marine cargo shipping. Since its creation, the Blair Waterway has been actively operated, managed, and maintained as an industrial and commercial navigable waterway. From its initial construction prior to 1920 to 1956, the Blair Waterway (first named Wapato Waterway and then Port Industrial Waterway), was incrementally deepened, widened and lengthened through actions under the River and Harbors Act of 1935, and the Rivers and Harbors Act of 1954. In 1956, the waterway was approximately 800 feet wide, and -30 feet MLLW, from the mouth to approximately Lincoln Avenue. The Rivers and Harbors and Flood Control Act of 1962 approved the waterway to be lengthened to its present configuration (approximately 2.6 miles), with a turning basin at the head of the navigation channel. The project was completed in 1969 and the waterway was renamed the Blair Waterway. In 1983-1984, investigations showed concentrations of arsenic, copper, lead, and zinc in surface water runoff from the site exceeded federal and state marine water quality criteria. In the mid-1990s, the Blair Waterway navigation channel and berth areas were dredged as part of the Sitcum Waterway Remediation Project under the CB/NT Superfund cleanup. The waterway was deepened from -30 feet to approximately -48 feet MLLW from the mouth to approximately 1,000 feet upstream of Lincoln Avenue, and to approximately -45 feet MLLW for the remainder of the waterway, including the turning basin. However, after cleanup, concentrations of metals (arsenic and lead) in soil exceeded MTCA (Model Toxics Control Act) Method A cleanup levels for industrial sites. In addition arsenic concentrations in stormwater exceeded water quality criteria (surface water runoff at the site discharges to the Blair Waterway). When an environmental covenant exists for a cleanup site, Ecology reviews site conditions about every five years to ensure the long-term effectiveness of the cleanup action. Ecology inspected the site on April 3, 2019, and investigated current conditions of the cap and the stormwater collection system. Conditions of the cap continues to prevent direct contact with contaminated soil and prevent stormwater from contacting or infiltrating the capped soils.

Sediment within the Blair Waterway have been classified by the Washington Department of Ecology as Waters of Concern (Category 2) for hexachlorobenzene and sediment bioassays. A small section of the waterway has also been classified as impaired waters that do not require a TMDL (Category 4b) for sediment bioassays. Soil, groundwater, and near shore sediment in the uplands around the Blair Waterway are potentially contaminated with residual hazardous materials including total petroleum hydrocarbons, metals, volatile organic compounds (VOCs), semi-volatile organic compounds and polychlorinated biphenyls (PCBs).

In 1999, the USACE evaluated the Blair Waterway and determined deepening the navigation channel from -48 feet and -45 feet MLLW to -51 feet MLLW in its entirety would eliminate navigation inefficiencies for post-Panamax shipping vessels and would not result in significant environmental impacts. The entire Blair Waterway navigation channel was dredged in 2000 to its current depth of -51 feet MLLW. Two pier realignments and two maintenance dredges have occurred in the Blair Waterway in the last 15 years. First, 600 feet of the Blair Terminal was demolished, the bank cutback to align with WUT and 600 feet of new pier was added to the south end of WUT. A small maintenance dredge (approximately 3,300 cubic yards) was performed at WUT in 2009. Next, a maintenance dredge was conducted at Husky Terminal (approximately 42,100 cubic yards) around 2011 to remove high spots from shoaling and sloughed material. Finally, most of Pier 4 at Husky Terminal was demolished and the bank cutback to align with Pier 3 starting in 2014. Part of that action was conducted as an emergency cleanup coordinated by the EPA due to very high levels of Tributyltin found during sediment characterization.

Sediments within the Blair Waterway within the action areas are predominantly fine-grained, and generally consist of sand and silty sand, as well as organic sediments that enter the action areas from the Puyallup River and Wapato Creek. High sediment and turbidity are major factors within the Blair Waterway, primarily due to propwash from vessel activities and turbidity from the Puyallup River, which enters the waterways on flood tides. High levels of turbidity in inner Commencement Bay occur routinely due to the naturally high turbidity of the Puyallup River. In the deep-water habitats, turbidity is generally lower than surface turbidity.

The existing Port facilities is a mix of commercial fishing and vessel infrastructure as well as commercial development landward of HAT that degrade habitat conditions for listed species in their nearshore marine lifestage, and have long-term effects on the estuarine and marine nearshore environment. These effects result in obstruction of fish movement and potential reduction in food supply from over-water structures and shoreline modifications. They mostly apply to juvenile PS Chinook salmon which migrate or rear in the nearshore area. These habitat changes, which will persist for the duration the Port is in place, will result in an incremental increase in stress and reduction in foraging success. The existing structures will permanently and incrementally degrade nearshore habitat conditions and restoration of the channel dredge depth will extend the continuation of this degraded habitat. The past and ongoing anthropogenic impacts described above have reduced the action area's ability to support migrating PS Chinook salmon. NMFS expects that the existing facilities would persist as a feature in the nearshore and aquatic environment and affect fish habitat for a period of several decades or longer. This expectation is based on the fact that the facilities are primarily constructed of concrete, asphalt, and steel, which degrades slowly.

2.3.2 Species in the Action Area

Two ESA-listed fish could occur within the action area: Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*), and PS steelhead (*Oncorhynchus mykiss*). Puget Sound ESU Chinook salmon have been documented in Hylebos Creek (via the Hylebos Waterway) and Commencement Bay, but not the Blair Waterway (WDFW 2020b). The Blair Waterway is not fed by any freshwater streams, and therefore is unlikely to have regular presence of either PS Chinook or steelhead in high numbers. However, based on the proximity of the action area to the natal streams and migration corridors such as the Puyallup River and Hylebos Creek, and the presence of potential suitable habitat for adults and out-migrating juveniles, ESA-listed Chinook salmon may occur in the area either as adults or juveniles of the following specific populations: Puyallup, White, Carbon, and Hylebos. Adult Chinook salmon, if present within the action areas, would most likely temporarily hold within the waters of Commencement Bay before they migrate to upstream spawning waters within the Puyallup Basin. Adult Chinook salmon are not likely to be present within the Blair Waterway for an extended period of time. Furthermore, Chinook salmon use of the Blair Waterway is up to three times greater near the mouth of the waterway than near the head, where they are found in very low numbers (Duker et al. 1989). Similarly, juvenile Chinook salmon are not expected to spend significant time within the Blair Waterway, but could potentially rear within the nearshore waters of Commencement Bay. No part of the waterway within the action areas provide suitable spawning habitat for Chinook salmon, as the waterway is in a marine environment.

Similar to Chinook salmon, the action area has some potentially suitable habitat for return migrating adults and out-migrating juvenile Puget Sound DPS steelhead. Puget Sound DPS steelhead have been documented in Hylebos Creek (via the Hylebos Waterway), Wapato Creek (via the Blair Waterway), and Commencement Bay (WDFW 2017b). However, NMFS is not aware of documented use of Puget Sound DPS steelhead within Wapato Creek within at least the past 20 years and does not consider Wapato Creek to provide suitable habitat for steelhead (Leon Environmental LLC., 2021). Adult and juvenile steelhead most likely use the waterways holding area before they enter migration corridors. Puget Sound DPS steelhead could be present at all times of the year and migrate through Commencement Bay and the Puyallup River, or within the Hylebos Waterway to Hylebos Creek. Outmigration of juveniles typically occurs between approximately the middle of March through the middle of July, and rearing juveniles could be present in Commencement Bay or adjacent waters of Puget Sound at any time of the year, including in the action area.

2.4 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).

As described in Section 1.3, the Port of Tacoma proposes to conduct maintenance dredging at two locations in Blair Waterway. Mechanical dredging with a barge-mounted clamshell bucket would be the predominant method.

Temporary effects of the proposed action are reasonably certain to include: 1) reduction in water quality from suspended sediment; 2) reduction in available prey from disturbed benthic conditions; and 3) entrainment. These changes in the environment will affect PBFs of critical habitat, and the species that are present when these effects occur.

The proposed action will extend the life of the channel for a period of time until dredging will again be required, thereby continuing the existence of the degraded habitat and effects to species in the area during that time.

2.4.1 Effects on Critical Habitat

The action falls within the critical habitat of PS Chinook salmon and PS steelhead. The action does not fall within the critical habitat of PS/GB bocaccio, PS/GB yelloweye rockfish, SRKW, or humpback whales, therefore effects on critical habitat PBFs are not evaluated here.

Features of critical habitat for salmonids in the action area are:

1. Estuarine areas free of obstruction and excessive predation with: water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;
2. Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and
3. Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

The dredging will disturb bottom substrates, causing temporary effects to physical and biological features of critical habitat for PS Chinook and PS steelhead salmon. Those effects are:

1. *Water Quality/Turbidity and Dissolved Oxygen (DO)* - Dredging will degrade water quality in the berth and a 200-foot area surrounding the berth by elevating suspended sediments for up to 20 working days (4 weeks) within the in-water work window, and which will return to baseline levels within hours after work ceases. Water quality conditions for juvenile maturation will be disrupted by the water quality degradation during this period. Maintenance dredging would cause no measurable changes in water temperature and salinity, but mobilized contaminants and suspended sediments into the water column, can reduce DO. Both turbidity and DO are expected to return to baseline within hours (turbidity) to days (DO) after work ceases. Based on these factors, and the brevity of the in-water work, the impairment of this PBF will only briefly diminish the water quality conditions necessary to support juvenile salmonids during their transition to saline habitat.

2. *Water Quality/Pollutants* – Increased levels contaminants re-suspended in the water column could co-occur with the dredging, a following briefly after the commencement of activity. This aspect of water quality degradation could temporarily impair the value of critical habitat for growth and maturation of juvenile salmon by exposing them to pollutants with both immediate and latent health effects, and could incrementally impair forage/prey communities that are exposed to the contaminants, delaying the speed that these communities re-establish after being physically disrupted by dredging. This impairment of the water quality PBF for juvenile transition to the saltwater environment is also constrained in space and by the brevity of the work window.

3. *Forage and Prey/Reduced prey abundance from dredging* – Removing bottom substrate will simultaneously remove the benthic communities that live within those sediments, reducing prey availability in the footprint of the dredge. Among prey fishes, short-term and intermittent exposure to reduced water quality could result in minor reductions in

forage species via gill damage of forage fishes. Suspended sediment will eventually settle in the area adjacent to the dredge prism, which can disrupt benthic prey species, and if the sediments are contaminated, then sublethal toxicity of benthic prey species could occur within 200 feet of dredging activities. These prey then can become a source of bioaccumulation, which degrades the quality of the prey. Prey will be reduced in total abundance and in quality, and this diminishment will persist for weeks to months.

2.4.2 Species Effects

Effects of the proposed action on species are based, in part, on exposure of species to the effects to features of habitat, as described above. Adult PS Chinook and PS steelhead will be exposed to temporary diminishment of water quality from elevated suspended sediment and contaminants, and modified benthic prey. Entrainment and strike during the operation of the dredge equipment might also occur. No permanent pathways of fish exposure to effects are expected as a result of the proposed dredging.

Salmonid Response to Reduced Water Quality/Turbidity and Dissolved Oxygen (DO)
As part of the proposed action, maintenance dredging will disturb sediments and temporarily increase turbidity within the action areas. Dredging will cause 4 weeks of localized increases in turbidity and total suspended solids (TSS). Increased turbidity is anticipated to be limited to the area within 200 feet of dredging. Elevated suspended sediments affect ESA-listed species in several ways, including: (1) reduction in feeding rates and growth, (2) physical injury, (3) physiological stress, (4) behavioral avoidance, and (5) delayed migration.

Laboratory studies have consistently found that the 96-hour median lethal concentration of fine sediments for juvenile salmonids is above 6,000 mg/L (Stober et al. 1981) and 1,097 mg/L for 1 to 3-hour exposure (Newcombe and Jensen 1996). Lethal concentrations and duration of exposure are not likely to occur for several reasons. LaSalle et al. (1991) determined that, within 300 feet of bucket dredging fine silt or clay, the expected concentrations of suspended sediment would be about 700 and 1,100 mg/L at the surface and bottom of the water column, respectively. Lower concentrations are expected at the project location, because the sediment consists primarily of sand. Additionally, because the dredging occurs in open water, we expect juvenile salmonids to be able to detect and avoid areas with high levels of suspended sediment (Armstrong et al., 2003, Ayllón et al., 2010), as cited in Berli et al 2014, reducing duration and intensity of exposure.

In addition to this behavioral response, however some exposure to suspended sediments is likely and can elicit an array of responses. Even moderate levels of suspended sediment exposure not associated with gill damage can affect the respiratory ability of salmonids (Waters, 1995) and trigger an acute stress response (Michel et al., 2013). Some sediment-associated stress responses include elevated plasma glucose and plasma cortisol (Redding and Schreck, 1982, Servizi and Martens, 1992), increased cardiac output (Bunt et al., 2004), and changes in hematological parameters (Lake and Hinch, 1999, Michel et al., 2013). Suspended solids are also known to impact fish's feeding ability (e.g. due to impaired spotting of prey), routine activity, and stress levels (Berg and Northcote, 1985, Sweka and Hartman, 2001, De Robertis et al., 2003, Robertson et al., 2007, Awata et al., 2011). Behavioral responses (e.g., alarm reaction and avoidance of the plume) can occur with only six minutes of exposure (Newcombe and Jensen

1996). Physiological effects (e.g., gill flaring and coughing) may occur with 15 minutes of exposure, temporary reduced feeding rates and success with 1 hour of exposure, and moderate levels of stress with 3 hours of exposure (Newcombe and Jensen 1996). The number of individuals that would be affected by this stressor is unquantifiable with any degree of certainty. However, the small affected area suggests that any individuals that may be affected 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 any detectable population-level effects.

To the extent that juvenile and adult salmonids are present in the areas with elevated suspended sediment, they are expected to be of sufficient size to swim away from these areas, which would limit the potential for, and duration of, exposure.

Both sites of the proposed action are located within areas that are currently or were formerly within the Commencement Bay Nearshore/Tideflats (CB-NT) Superfund site. The Blair Waterway has been cleaned up and removed from the Superfund. Water quality is already a limiting factor within the action areas, and temporary increases in sedimentation and turbidity during the proposed action are not likely to result in an increased potential for negative effects.

Mobilization of anaerobic sediments can decrease dissolved oxygen (DO) levels (Hicks et al. 1991; Morton 1976). Given the high rate of tidal exchange in the entrance channel and small affected area, any reductions in DO from dredging will be too small and short-lived to have detectable effects on the behaviors or fitness of any PS Chinook salmon or PS steelhead exposed. Shipping traffic throughout the action areas routinely disturbs sediments. Any temporary increase in turbidity as a result of the proposed action is not anticipated to measurably exceed levels caused by normal periodic increases due to this industrial traffic or highly turbid water from the Puyallup River within the waterways. The generally slow velocity of water movement within the action areas will also greatly minimize the potential negative effects of temporarily increased turbidity.

Response to reduced prey

Essentially, the effect of dredging activities on macrofauna assemblage recovery depends on the methods used, duration and frequency of dredging, the area and amount of material to be dredged, substrate characteristics, resulting sedimentary profile of the affected seabed, local hydrology, seasonal effects (Barrio Froján et al., 2011, Newell et al., 1998) and biotic interactions (Ólfasson et al., 1994). Areas where sediment is removed by dredging will diminish benthic prey communities. In areas where suspended sediment settles on the bottom, some smothering can occur which also disrupts the benthic communities. The speed of recovery by benthic communities is affected by several factors, including the intensity of the disturbance, with greater disturbance increasing the time to recovery (Dernie et al., 2003). Additionally, the ability of a disturbed site to recolonize is affected by whether or not adjacent benthic communities are nearby that can recolonize the affected area, and the composition of the species that recolonize the area may differ from a less frequently perturbed area, as disturbances caused by dredging may lead to a decline in sensitive species, to be subsequently replaced by more tolerant species (Ceia et al. 2013). Lastly, suspended sediment will eventually settle in the area adjacent to the dredge prism, which can disrupt benthic prey species, and if the sediments are contaminated, then sublethal toxicity of benthic prey species could occur. These prey then can become a source of bioaccumulation, which degrades the quality of the prey.

Entrainment and trike during Dredging

In this context, entrainment refers to the uptake of aquatic organisms by dredge equipment (i.e., the dredge bucket). Dredge buckets entrain slow-moving and sessile benthic epifauna along with burrowing infauna that are removed with the sediments. They also entrain algae and aquatic vegetation. There is little evidence of mechanical dredge entrainment of mobile organisms such as fish.. In order to be struck by or entrained in a dredge bucket, an organism must be directly under the bucket when it drops. The small size of the bucket, compared against the distribution of the organisms across the available habitat make this situation very unlikely. That likelihood would decrease after the first few bucket cycles, because mobile organisms are most likely to move away from the disturbance. Further, dredges move very slowly during dredging operations, with the excavator typically staying in one location for many minutes to several hours, while the bucket is repeatedly lowered and raised within an area limited to the range of the crane arm.

While the in-water work window of July 16-February 14 reduces the likelihood of juvenile fish presence in high numbers (peak outmigration of Green River PS Chinook is in June, for example and outmigration is March to July for steelhead), it does not avoid the presence of juvenile salmonids. Based on information provided to the USACE in 2018, juvenile fish, particularly steelhead, are likely to be present during the entire work window though based on the poor habitat conditions, we expect presence to be in relatively low numbers at any given time.

Adult PS Chinook and PS steelhead may pass through the area during migration to their natal streams. Adult PS Chinook salmon, adult PS steelhead, are strong swimmers that are likely to engage in avoidance behavior to avoid the noise and activity, which reduces the likelihood of entrainment or strike. Based on the best available information described above (NMFS 2012), NMFS considers it highly unlikely that adult PS Chinook salmon or adult PS steelhead, would be struck or entrained by the dredging equipment.

Summary of Effects to Salmonid Population Viability

We assess the importance of habitat effects in the action area to the ESUs by examining the relevance of those effects to the characteristics of VSPs. The characteristics of VSPs are sufficient abundance, population growth rate (productivity), spatial structure, and diversity. While these characteristics are described as unique components of population dynamics, each characteristic exerts significant influence on the others. For example, declining abundance can reduce spatial structure of a population; and when habitats are less varied, then diversity among the population declines.

There are no streams that feed into the Blair Waterway, so we expect that populations most likely to be present in the action area come from the Hylebos and Puyallup River, and tributaries to the Puyallup, such as White River and Carbon. A 2012 analysis by the Puget Sound Ecosystem Monitoring Program (PSEMP) identified VSP scores for both salmonid species of concern. PS Chinook Puyallup population received a score of 70 out of 100. The PS steelhead Puyallup river population received a score of 59 out of 100. Scores above 69 are considered good, 69 to 50 moderate, and less than 49 are considered inadequate. The 2015 salmon status update (NWFSC, 2015) reportedthat the Puyallup river Chinook population has dropped by 25% between the years 2005-2009 and 2010-2014. The report identifies several stressors likely causing the decline including; by catch, limited riverine habitat, and poor ocean conditions.

Abundance. As discussed in Section 2.3.2, the existing Port facilities have long-term effects on the estuarine and marine nearshore environment. Effects to individual fishes will occur among an undetermined percentage of all future cohorts of the two populations that use the action area. While we cannot quantify these long-term structure-related effects, we believe them to be limited and proportional to the size of affected habitat. We expect this degradation in habitat to result in a long-term, but very small decrease in abundance among the two populations of PS Chinook that encounter the dredged area. Because PS steelhead do not use the estuarine or marine nearshore habitat, we do not expect the proposed project to effect the abundance of PS steelhead.

Productivity. In response to the existing degraded habitat, we expect juvenile salmonids will experience reduced foraging success and increased energy expenditure. All these effects, independently or in combination, are likely to lead to proportional decreases in individual fitness and survival. The permanent changes to the nearshore environment are expected to exert a sustained downward pressure on estuarine habitat function in the PS and, proportionally to the relatively small amount of habitat affected, reduce the rearing and foraging capacity of the action area. Because PS steelhead do not use the estuarine or marine nearshore habitat, we do not expect the proposed project to affect the productivity of PS steelhead.

Spatial Structure. We do not expect the proposed project to affect the spatial structure of the PS Chinook ESUs or PS steelhead. Salmonid populations spread across the nearshore and mix when they enter tidal waters. This project will likely not disproportionately affect any one population.

Diversity. Salmon have complex life histories and changes in the estuarine environment will have a greater effect on specific life history traits that make prolonged use of this habitat. This will likely result in a slight, proportional to the limited habitat alteration, decline in PS Chinook diversity by differentially affecting specific populations that encounter the developed area in greater frequency during their early estuarine life history. We do not expect the proposed project to affect the diversity of PS steelhead.

2.5 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). We could expect over the 10-year period of the proposed action that some climate effects, described in the baseline, such as warming water temperatures, or increasing variability of volume (low flows, high flows) become more pronounced. These effects could increase food web disruptions, migration success, or other stresses on any or all of the listed species that rely on the action area.

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 shoreline development, vessel activities, and upland urbanization. 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 social groups dedicated to restoration and use of natural amenities, such as cultural inspiration and recreational experiences.

NMFS is aware of the future "Tacoma Harbor Navigation Improvement Project" that is reasonably certain to affect the action area, however this action will have a federal nexus triggering specific evaluation and therefore it is not considered as a cumulative effect under the ESA. 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 nearshore waters within the action area is 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 species in 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.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

The species considered in this Opinion have been listed under the ESA, 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. Each 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. The action area provides habitat for nearshore marine life histories of PS Chinook salmon and PS steelhead, although at a degraded state.

Within the action area there are sources of noise and shade (vessels), water quality impairments (nonpoint sources), and artificial light (marinas and fishing piers). To this context of species status and baseline conditions of the existing degraded habitat of the Port facilities, we add the temporary effects of the proposed action, the long term effects of extending the life of the channel, together with cumulative effects (which are anticipated to be future nonpoint sources of water quality impairment associated with development and stressors associated with climate change), in order to determine the effect of the project on the likelihood of species' survival and recovery. We also evaluate if the project's habitat effects will appreciably diminish the value of designated critical habitat for the conservation of the listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.

Chinook Salmon

The action area supports PS Chinook salmon adult and juvenile migration, and juvenile rearing. The long-term trend in abundance of the PS Chinook salmon ESU is slightly negative. Reduced or eliminated accessibility to historically important habitat, combined with degraded conditions in available habitat appear to be the greatest threats to the recovery of PS Chinook salmon. Degraded water quality and temperature, degraded nearshore conditions, and impaired passage for migrating fish also continue to impact this species.

During the in-water work period, out-migrating juvenile and migrating adult salmon and steelhead could be present within the action areas. Any of these species, if present, would likely be migrating through the action areas and not be present for any significant period of time. As adults are likely to swim away to avoid dredging noise and activity, it is highly unlikely that they would be struck or entrained by dredging equipment. Individual fish present may be exposed to sediment concentrations that are expected to elicit temporary behavioral effects (e.g., avoidance of the plume), temporary physiological effects (e.g., gill flaring), temporary reduced feeding rates and success, and moderate levels of stress, which may affect the fitness of the exposed individual.

The environmental baseline within the action area has been degraded by the effects shoreline development and vessel activities. The baseline has also been degraded by nearby industry, urbanization, agriculture, forestry, water diversion, and road building and maintenance. Dredging-related impacts are likely to cause a range of effects that both individually and collectively would cause altered behaviors, reduced fitness, and possible mortality in some juveniles. However, the annual numbers 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, will be too small to cause any population level impacts on PS Chinook salmon. Therefore, the proposed action will not appreciably reduce the likelihood of survival and recovery of this listed species.

Steelhead

The action area supports adult and juvenile migration. The DPS is currently at very low viability, and long-term abundance trends have been predominantly negative or flat across the DPS. Continued destruction and modification of habitat, widespread declines in adult abundance, and declining diversity appear to be the greatest threats to the recovery of PS steelhead. Reduced habitat quality and urbanization also continue to impact this species. The environmental baseline within the action area has been degraded from the creation of the entrance channel, shoreline development, and maritime activities. However, despite this degraded condition, the area remains supportive of PS steelhead.

Project-related work will overlap with the presence of out-migrating juvenile PS steelhead, and returning adults. Very low numbers of adult PS steelhead may be displaced due to noise from dredging and vessel activity. As adults are likely to swim away to avoid dredging noise and activity, it is highly unlikely that they would be struck or entrained by dredging equipment. Adults present may be exposed to sediment concentrations that are expected to elicit temporary behavioral effects (e.g., avoidance of the plume), temporary physiological effects (e.g., gill flaring), temporary reduced feeding rates and success, and moderate levels of stress, which may affect the fitness of the exposed individuals. The effects of this exposure are uncertain, but not expected to result in injury to individual fish.

The number of juveniles that are likely to be injured or killed by action-related stressors is unknown, but is expected to be extremely low because they are not expected to be present, and such a small fraction of a cohort that it will have no detectable effect on any of the characteristics of a VSP, abundance, productivity, distribution, or genetic diversity) for the affected population(s).

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, will be too small to cause any population level impacts on PS steelhead. Therefore, the proposed action will not appreciably reduce the likelihood of survival and recovery of this listed species.

2.7 Conclusion

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

2.8 Incidental Take Statement

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

2.8.1 Amount or Extent of Take

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

- Incidental take in the form of injury or death due to entrainment or strike during clamshell dredging,
- Incidental take in the form of harm from diminished water quality and diminished prey availability.

The distribution and abundance of 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 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, we 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 any of these stressors. Additionally, NMFS knows of no device or practicable technique that would yield reliable counts of individuals that experience these impacts. In such circumstances, 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.

For this proposed action, the potential for occurrences of 1) injury or death from entrainment, and 2) harm from being exposed to elevated turbidity and reductions in forage for juvenile salmonids, is directly related to the amount of time that the dredge is in operation, and the timing of the dredge operation.

Injury or Death from entrainment - Since the potential for ESA listed fish to be entrained is most directly determined by the amount of time the dredge is actively operating and the timing of the operation, the extent of take identified for the proposed action is related to the number of days of dredging within a timeframe that anticipates the lowest presence of vulnerable lifestages of listed fish. Therefore, the extent of take is a maximum of 20 days of dredging, to occur between July 16 – February 14. Exceeding this indicator for extent of take will trigger the reinitiation provisions of this opinion.

Harm from turbid conditions – Habitat modified temporarily by suspended solids and contaminants will actually injure fish by impairing normal patterns of behavior including rearing and migrating in the action area, and causing potential health effects. Take in the form of harm from these causes cannot be accurately quantified as a number of fish. The distribution and abundance of fish within the action area cannot be predicted based on existing habitat conditions, and because of temporal and dynamic variability in population dynamics in the action area, nor can NMFS precisely predict the number of fish that are reasonably certain to respond adversely to habitat modified by the proposed action. When NMFS cannot quantify take in numbers of affected animals, instead we consider shifts to the likely extent of changes in habitat quantity and quality to indicate the extent of take.

Because injury to individuals can occur when exposed to high levels of suspended sediment, or as a result of avoiding areas affected with high levels of sediment, the extent of take is measured as the anticipated area where suspended sediment will be present. The levels of suspended contaminants are expected to be proportional to the amount of injury that the proposed action is likely to cause through physiological stress from elevated suspended sediments and contaminants throughout the duration of the projects' in water activities and potentially throughout the compliance boundary of 200 feet from ongoing activities.

The maximum extent of take is defined by the compliance area for turbidity monitoring within the 200 foot buffer around the project (action area). Within the compliance boundary, injury may occur to listed species present in the area due to increased contaminant exposure. In this case, the point of compliance for a temporary area of mixing shall be at a radius of 200 feet from the activity causing the turbidity exceedance, resulting in an area of 243,300 square feet. This distance is well beyond the distance at which construction turbidity is likely to be visible in the highly turbid surface waters of Commencement Bay.

Harm from diminished prey availability – Reductions in fitness among juveniles are likely when prey availability is decreased and competition increases for prey resources. The extent of take is therefore measured as the area of harbor bottom where dredging will remove substrate and the benthic prey communities (233,100 square feet between the two terminals).

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 still function as effective reinitiation triggers because the Corps has authority to conduct compliance inspections and to take actions to address non-compliance (33 CFR 326.4).

2.8.2 Effect of the Take

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

2.8.3 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 USACE shall require any permittee or contractor performing the work described in this document to:

1. Minimize incidental take from entrainment and strike during dredging;
2. Minimize incidental take from turbidity and suspended sediments during dredging; and
3. Ensure completion of an annual monitoring and reporting program to confirm the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the USACE or the Port of Tacoma must comply with them in order to implement the RPMs (50 CFR 402.14). The USACE or the Port of Tacoma 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.

The following terms and conditions implement RPM 1, minimize entrainment and strike during dredging:

a. The applicant, Port of Tacoma, shall ensure that during dredging operations, the clamshell bucket is lowered to the bottom as slowly as possible to allow ESA listed fish the opportunity to escape.

The following terms and conditions implement RPM 2, minimize turbidity during dredge operation:

a. The applicant, Port of Tacoma, shall ensure turbidity remains at background levels at a radius of (200 feet) from the activity during dredging operations by adhering to dredge management protocols including monitoring and compliance reporting of turbidity levels observed during dredging operations.
    i. Limit sediment removal to no more than 26,890 cubic yards; and
    ii. Adjust dredging operations to ensure that visible turbidity plumes do not exceed 200 feet from the project site, and to halt work should the visible turbidity plume approach and that range; and
    iii. If turbidity levels are exceed the standards as described in the Water Quality Certification for this project, install a floating silt curtain around the in-water dredge area to minimize the dispersion of suspended sediment thereby reducing turbidity.
b. USACE and the applicant shall ensure in-water work will be performed in accordance with permit conditions, which set timing restriction so in-water work occurs during the period of July 16 to February 14.

The following terms and conditions implement RPM 3, monitoring and reporting:

a. Action Monitoring. The applicant shall submit a monitoring report to NMFS by March 31 summarizing the following for the previous calendar year:
    i. Hours of dredging for each day dredging occurred;
    ii. The number of days dredging occurred each month;
    iii. The number of days of dredging occurred for the previous calendar year;
    iv. The daily and cumulative sediment removal totals Turbidity levels from monitoring and whether turbidity compliance was met.
    v. Monitoring reports shall be submitted to:
    projectsreports.wcr@noaa.gov
    Include WCRO-2021-00698 in the subject line.

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following three conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the USACE:

1. Regularly require use of floating silt curtains around the in-water dredge area in the Blair Waterway to minimize the dispersion of suspended sediment thereby reducing turbidity.
2. Narrow the conditions under which maintenance dredging is allowed so that habitat values can more completely recover between dredge occurrences, for example dredging would not

be allowed annually, without a showing that sediment accumulation is occurring or has occurred that threatens to impair navigation or berthing.

3. The USACE should consult with NMFS under Section 7(a)(1) to create a mitigation bank to offset impacts associated with the regular exercise of its authority allowing impacts to the nations waters.

Please notify NMFS if the USACE or the applicant carries out this recommendation so that we will be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

2.10 Species and Critical Habitats Not Likely to be Adversely Affected

The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Adult Bocaccio and Yelloweye Rockfish are not expected to occur within the action areas, as water depths are too shallow, and substrates consist of silty sand and sandy silt. These fish species are associated with deepwater habitats of Puget Sound and typically breed and forage near the ocean floor. The nearshore habitat in the action area is lacking any eelgrass, kelp, or other aquatic vegetation that would be preferred by juvenile or larval Bocaccio, and high shipping activity and water quality conditions limit the habitat suitability within the action areas. Juvenile or larval Yelloweye Rockfish are not likely to be present within the waterways as they do not frequently use nearshore habitat. Typically, they settle quickly to shallow, high relief areas and then move to deep-water habitat, and are most frequently found in association with floating kelp beds, which are not present within the action areas (Love et al. 1991). Deep water portions outside of the action areas that extend into Commencement Bay provide some suitable habitat for adult and juvenile Bocaccio and Yelloweye Rockfish, and these species could be present within those areas at any time of the year. Larvae and small juveniles located within the greater Puget Sound during the spring and summer months are subject to currents that may potentially drift the fish into the Project action area, but because the abundance of mature breeding fish in adjacent areas is likely to be very low based on poor habitat conditions, we do not expect presence of larvae or juveniles during the work window even though the work window overlaps peak larval presence generally. Because effects of the proposed action (water quality reductions) are unlikely to reach areas where either species of rockfish are present, nor the areas designated as critical habitat, we consider effects of the proposed action are discountable and therefore not likely to adversely affect either individuals of these species or their critical habitat.

Southern Resident killer whales are unlikely to be present in the action areas. Instead, they would be limited to the waters of Commencement Bay and adjacent waters of Puget Sound. Southern Resident killer whales are most commonly observed in Commencement Bay between October and January, with the greatest potential for occurrence being between December and January

(Osborne 2008). In 2014, one satellite-tracked Southern Resident killer whale was documented in Commencement Bay (NWFSC 2014); however, they have not been documented in inner Commencement Bay or the Blair Waterway. The Blair Waterway does not provide suitable habitat, and Southern Resident killer whales are not expected to occur in the nearshore environment within the action areas.

Southern resident killer whales will not be exposed to the short term water quality effects of the action because the area affected by water quality disturbance will not disperse into areas they could be found. It is very unlikely that SR killer whales would be present within the Blair Waterway where disturbance effects would occur. Thus, water quality effects on SR killer whale growth or development will be insignificant. The proposed action may affect the quantity of their preferred prey, Chinook salmon. Any salmonid take will be very minor and the extent of take would result in an insignificant reduction in adult equivalent prey resources for SR killer whales that may intercept these species within their range. Finally, the dredging will not affect migration.

While PS Chinook salmon are prey, a PBF of SRKW designated critical habitat, juvenile chinook are not likely to be affected by reduction in abundance to the degree that returning adult fish (the lifestage upon which SRKW prey) will be diminished. Because SRKW prey and water quality will not be altered by the proposed action, we consider all effects to SRKW critical habitat insignificant or discountable.

Based on this analysis, NMFS determined the action is not likely to adversely affect the Southern resident killer whales or their critical habitat.

Humpback whales are occasionally sighted in south Puget Sound, but they have never been documented in the Blair Waterway. Humpback whales, if present in the project vicinity, would only be expected to occur in the waters of adjacent Puget Sound, and not within inner Commencement Bay. Humpback whales will not be exposed to the short term water quality effects of the action because the area affected by water quality disturbance will not disperse into areas they could be found. Humpback whales are present only infrequently in the adjacent waters of Puget Sound, and are not expected to be present within the Blair Waterways at any time of the year, and will not be affected by activities conducted within the waterway. Thus, water quality effects on humpback whale growth or development will be insignificant. Finally, the dredging will not affect migration.

Based on this analysis, NMFS concurs with COE that the proposed action is not likely to adversely affect the subject listed humpback whales.

2.11 Reinitiation of Consultation

This concludes the ESA section 7 consultation for Blair Waterway Maintenance Dredging Project.

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-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

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

This analysis is based, in part, on the EFH assessment provided by the USACE and descriptions of EFH for Pacific Coast salmon (PFMC 2014), and Pacific Coast groundfish (PFMC 2005) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

As part of the information provided in the request for ESA concurrence, the USACE determined that the proposed action may have an adverse effect on EFH designated for Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species.

3.2 Adverse Effects on Essential Fish Habitat

The proposed action will temporarily diminish water quality, disturb benthic habitat and bottom sediments, and resuspend contaminated sediments contemporaneously with pulses of turbidity. Because the action is a maintenance dredge area of disturbance is relatively small, and the disturbance will be short-lived, will maintain current conditions, and will not change the functional characteristics of the habitat.

3.3 Essential Fish Habitat Conservation Recommendations

The proposed action includes conservation measures, BMP and design features to reduce construction-related impacts on the quantity and quality of EFH for Pacific Coast Salmon (Chinook Salmon, coho salmon and pink Salmon), Pacific Coast Groundfish (e.g. flounder, sole),. The effects of the proposed action will be minimized by use of clamshell dredge. With the exception of the following conservation recommendation to reduce impacts on water quality and prey availability, NMFS knows of no other reasonable measures to further reduce effect on EFH.

To reduce adverse impacts on water quality and prey availability, the USACE should require the applicant to:

1. Require that the contractor use a floating silt curtain during dredging to reduce the likelihood of extensive fine sediments plume; and
2. Require vessel operators to operate at the lowest safe maneuvering speeds and power settings when maneuvering in waters close to the shoreline.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, USACE 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)).

3.5 Supplemental Consultation

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

4.DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The 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.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are USACE and the Port of Tacoma. Individual copies of this opinion were provided to the USACE. 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.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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