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

Refer to NMFS No:
WCRO-2018-00063

May 23, 2019

Michelle Walker
Chief Regulatory Branch
Seattle District, U.S. Army Corps of Engineers
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 Port Angeles Terminal 3 Maintenance Dredge Project, Clallam County, Washington (6th Field HUC 171100200405).

Dear Ms. Walker:

Thank you for your email on October 29, 2018, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the U.S. Army Corps of Engineers' (COE) proposed issuance of a permit to the Port of Port Angeles for dredging of Terminal 3. In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) chinook, Hood Canal summer-run chum, PS steelhead, or North American green sturgeon (southern DPS). The project is also not likely to result in the destruction or adverse modification of critical habitat designated for PS chinook, or green sturgeon.

This document also serves to document our concurrence that the proposed action is not likely to adversely affect eulachon (Southern DPS), Humpback whale (Central America DPS, or, Mexico DPS) or SRKW and its designated critical habitat. The COE has determined No Effect for PS Georgia Basin (GB) bocaccio, PSGB yelloweye rockfish, and the leatherback sea turtle. In determining 'No Effect' the NMFS does not consult on the effects of the proposed action and the action agency assumes responsibility for take of any bocaccio, yelloweye rockfish or leatherback sea turtle that were to occur.

As required by section 7 of the Endangered Species Act, the National Marine Fisheries Service provided an incidental take statement with the biological opinion. The incidental take statement describes reasonable and prudent measures the National Marine Fisheries Service considers necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions. Incidental take from actions that meet the term and condition will be exempt from the Endangered Species Act take prohibition.

NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)), and concluded that the action would adversely affect the EFH of Pacific Coast groundfish, coastal pelagic species, and Pacific Coast salmon. Therefore, we have included the results of that review in Section 3 of this document.

Please contact Lisa Abernathy of the Oregon/Washington Coastal Area Office at (206) 526-4742, or by email at Lisa.Abernathy@noaa.gov if you have any questions concerning this Section 7 consultation, or if you require additional information.

Sincerely,

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

cc: Pamela Sanguinetti, U.S. Army Corps of Engineers
Chris Hartman, Port of Port Angeles
Jessi Massingale

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 Angeles Terminal 3 Maintenance Dredge Project, Clallam County, Washington

NMFS Consultation Number: WCRO-2018-00063

Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Puget Sound (PS) Chinook *(Oncorhynchus tshawytscha)*	Threatened	Yes	No	Yes	No
Hood Canal summer-run chum (*Oncorhynchus keta*)	Threatened	Yes	No	No	No
PS steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No	No
Eulachon, Southern DPS (*Thaleichthys pacificus*)	Threatened	No	No	No	No
North American green sturgeon southern DPS (*Acipenser medirostris*)	Threatened	Yes	No	Yes	No
Humpback whale, Central America DPS (*Megaptera novaeangliae*)	Endangered	No	No	Not Designated	No
Humpback whale, Mexico DPS (*Megaptera novaeangliae*)	Endangered	No	No	Not Designated	No
Southern Resident killer whales (*Orcinus orca*)	Endangered	No	No	No	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Groundfish	Yes	No
Coastal Pelagics	Yes	No
Pacific Coast Salmon	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: May 23, 2019

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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.

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). A complete record of this consultation is on file Oregon and Washington Coastal Office.

1.2 Consultation History

This biological opinion is based on the information provided in the October 29, 2018, Port of Port Angeles Terminal 3 Maintenance Dredging biological evaluation (BE). The U.S. Army Corps of Engineers (COE) requested informal consultation on October 10, 2018. The NMFS issued the COE a letter of non-concurrence for the maintenance-dredging project. On October 29, 2018. On October 30, 2018, the COE requested formal consultation and at that time NMFS initiated formal consultation. This was followed by the lapse in government funding which caused a 5 week shut down of NMFS operations, delaying our analysis of the proposed action. A complete record of this consultation is on file at the Oregon Washington Coastal Office located in Lacey, Washington.

The COE concluded that the proposed action is not likely to adversely affect (NLAA) Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*), Hood Canal summer-run chum (*Oncorhynchus keta*), PS steelhead (*Oncorhynchus mykiss*), eulachon, southern distinct population segment (DPS) (*Thaleichthys pacificus*), North American green sturgeon, southern DPS (*Acipenser medirostris*), humpback whale (*Megaptera novaeangliae*), Central America DPS and, Mexico DPS, southern resident killer whale (SRKW) (*Orcinus orca)*; or result in the destruction or adverse modification of PS chinook, PS steelhead, or SRKW critical habitat. The COE also concluded No Effect for PS Georgia Basin (GB) bocaccio (*Sebastes paucispinus*), PSGB yelloweye rockfish (*Sebastes ruberrimus*), and the leatherback sea turtle (*Dermochelys coriacea*).

NMFS does not concur with the COE's determination that the proposed action is NLAA for PS Chinook salmon, Hood Canal summer-run chum, PS steelhead, and North American green sturgeon. NMFS does not concur with the COE's determination that the proposed action is NLAA for designated PS chinook critical habitat. There is no critical habitat designated in the action area for PS steelhead, however, green sturgeon critical habitat is in the action are and we believe that habitat is likely to be adversely affected.

NMFS does agree the action is NLAA for the eulachon, southern DPS, Central America DPS Humpback whale, Mexico DPS humpback whale, SRKW and its critical habitat.

NMFS also reviewed the likely effects of the proposed action on EFH, and concluded that the action would adversely affect the EFH of Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species.

1.3 Proposed Federal Action

For 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). For EFH, federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).]

The COE intends to issue a permit under its Section 404 Clean Water Act Authority to the Port of Port Angeles for maintenance dredging. The Port of Port Angeles proposes to dredge approximately 13,000 cubic yards of accumulated sediment from the vessel berth fronting Terminal 3 along the southern shore of Port Angeles Harbor (Figure 1). The current mudline elevations throughout the berth range from approximately -36 feet mean lower low water (MLLW) along the pier face to approximately -46 feet MLLW at the north end of the berth. The intent is to dredge to the previously authorized depth of -45 feet MLLW. The dredged volume includes an allowable 1.5-foot over dredge and conservatively includes the under-pier and side slope slough volumes with a 2:1 (H:V) slope. Dredging will occur by means of a clamshell bucket, handled by a crane on derrick barge. The barge will be anchored within the dredge footprint, and will reposition as dredging progresses. Dredged sediment will be placed on a flat deck barge with bin walls to contain the sediments. The bin walls will have scupper drains fitted with geotextile fabrics, straw bales, or similar to aid in the passive dewatering of sediments. The use of a clamshell dredge and passive dewatering are intended to reduce and/or avoid negative effects to water quality from dredge activities. Dewatered dredge material will be transloaded from the barge onto trucks at Terminal 3 then transported via primary arterials and other streets designed to support truck traffic to a nearby upland disposal site.

Project Timeline and Sequencing

The proposed maintenance dredging will occur within the agency-approved in-water work window, which extends from July 16 to February 15, each year that the COE's Section 404 permit is valid. The Port has identified the 2019/2020 in-water work window as the preferred timing for this work. However, if the regulatory approval process or construction-related preparation items result in schedule delays, the proposed maintenance dredging may occur in the

2020/2021 in-water work window. The proposed maintenance dredging is expected to require up to 30 days of in-water work. Work may start and stop around vessel schedules.

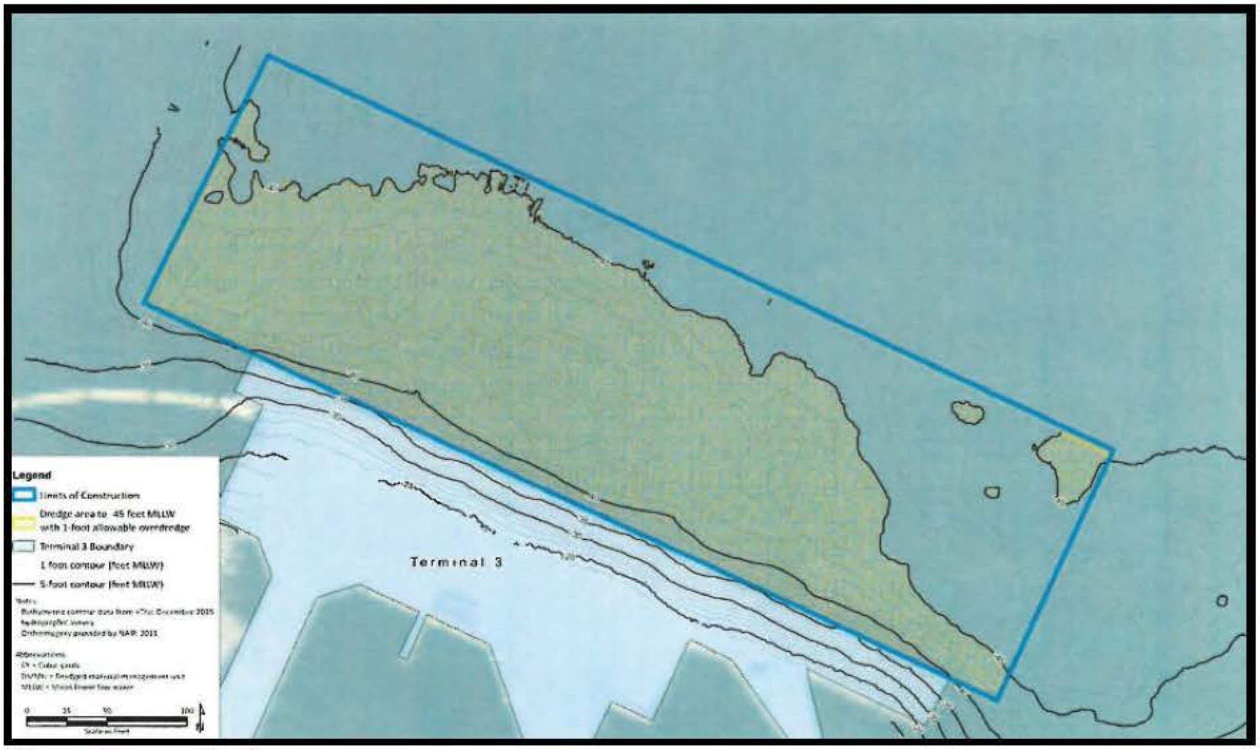

Figure 1. Dredge area

<u>Project Activity</u>

The purpose of the proposed maintenance dredging is to remove accumulated sediment that is impacting operations at the Port's primary cargo loading terminal. The dredge footprint is defined by the berth area, which begins at the face of Terminal 3 and extends waterward to a maximum of approximately 175 feet, and on either side of the pier face (east and west), by approximately 25 to 75 feet, respectively. The progression of dredging within the work area is expected to be tracked with dredge positioning software, which is used to obtain survey-accurate differential GPS lateral location of the dredge bucket.

The dewatered dredged material will be transloaded from the flat deck barge to a temporary stockpile location on Terminal 3 as needed throughout construction, if it is not transloaded directly to trucks. A spill plate may be placed between the flat deck barge and Terminal 3 during this transloading effort to avoid potential loss of dredged material back to the berth. Best management practices will be also implemented at the temporary stockpile location, if used, to control runoff and erosion. The temporary stockpile location may be bermed with silt fences or hay bales, and would be inspected routinely to ensure that material is properly contained.

Once in trucks, the dredged material would be transported to a permitted upland placement site. Trucks are expected to use primary arterials and other streets that are designed to support truck traffic, such as State Route 117 and Highway 101. The material is suitable for upland disposal as the results of dredge sediment characterization indicate no chemical exceedances of the MTCA

Method A and B soil criteria or Washington State natural background soil concentrations for metals. Additionally, the average dredge material total dioxins/furans toxic equivalent (TEQ) concentration is less than the Port Angeles urban background soil concentrations of dioxins/furans (Floyd Snider 2018) The upland disposal site regularly accepts and distributes such material and will have all required environmental approvals and permits in place.

Minimization Measures

The following measures are incorporated into the Terminal 3 maintenance dredging to avoid and minimize potential impacts from the proposed dredging.

- A Water Quality Monitoring Plan, Dredging Plan, Spill Prevention Countermeasure and Control Plan, and other relevant plans will be prepared, approved by the agencies with jurisdiction, and implemented by the Contractor during construction.
- Turbidity will be monitored to ensure construction activities are in compliance with Washington State Surface Water Quality Standards (WAC 173-201A), and all conditions specified in a project-specific Water Quality Certification, if determined to be required and issued by Ecology.
- During dredging, dredge material will be placed on a barge or scow and will be passively dewatered with water draining back to Port Angeles Harbor after sediment is allowed to settle and is passed through filter fabric or hay bales.
- 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.
- Dredge vessel personnel will be trained in hazardous material handling and spill response, and will be equipped with appropriate response tools, including absorbent oil booms. If a spill occurs, spill cleanup and containment efforts will begin immediately and will take precedence over normal work, and appropriate spill notifications will occur, per the conditions of the project permits and contract.
- The Contractor will inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks in order to prevent spills into the surface water.

“Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions” are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

The proposed action includes all dredging operations, moving and handling of the dredged material, and upland 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 activities that would directly or indirectly affect ESA-listed species that would be considered interdependent or interrelated actions, 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 Port of Port Angeles are part of the environmental baseline and no element of the action as we understand it will result in additional interrelated vessel-related effects at this location.

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 provides 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.

As described above in section 1.2, the COE determined the proposed action is not likely to adversely affect PS chinook, Hood Canal summer-run chum, PS steelhead, southern eulachon, southern green sturgeon, Central America humpback whale, Mexico humpback whale, and SRKW; or result in the destruction or adverse modification of PS chinook, PS steelhead, or SRKW critical habitat. However, NMFS has determined that the proposed action is likely to adversely affect PS chinook, Hood Canal summer-run chum, PS steelhead, and North American green sturgeon; or result in the destruction or adverse modification of PS chinook and southern green sturgeon critical habitat and that formal consultation was required. Our concurrence with the COE's "not likely to adversely affect" determinations for the remaining species and critical habitat is documented in the "Not Likely to Adversely Affect" Determinations section (2.12).

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that 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 for the conservation of a 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" (81 FR 7214).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace 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.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' 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., 2016; Mote et al., 2014). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Mote et al., 2014; Tague et al., 2013).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4 degrees Fahrenheit as an annual average, and up to 2 degrees Fahrenheit in some seasons (based on average linear increase per decade; (Abatzoglou et al., 2014; Kunkel et al., 2013)). Recent temperatures in all but two years since 1998 ranked above the 20th century average (Mote et al., 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10 degrees Fahrenheit, with the largest increases predicted to occur in the summer (Abatzoglou 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 (Abatzoglou et al., 2014). Precipitation is more likely to occur during October through March and less during summer months. More winter precipitation will be rain than snow (ISAB, 2007) (Mote et al., 2013; Mote et al., 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB, 2007; Mote et al., 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al., 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al., 2014).

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

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

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

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 1.0-3.7 degrees Celsius 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 (Reeder et al., 2013; Tillmann and Siemann, 2011).

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 CO2 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 (Reeder et al., 2013; Tillmann and Siemann, 2011). 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 (Reeder et al., 2013; Tillmann and Siemann, 2011).

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 the 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 of that habitat 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).

For most salmon and steelhead, NMFS's critical habitat analytical review teams (CHARTs) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005a). The conservation rankings were high, medium, or low. To determine the conservation value of each watershed to species viability, the CHARTs evaluated the quantity and quality of habitat features, 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. Even if a location had poor habitat quality, it could be ranked with a high conservation value if it were essential due to factors such as limited availability, a unique contribution of the population it served, or is serving another important role.

For southern DPS green sturgeon, a team similar to the CHARTs — a critical habitat review team (CHRT) — identified and analyzed the conservation value of particular areas occupied by southern green sturgeon, and unoccupied areas necessary to ensure the conservation of the species (USDC 2009). The CHRT did not identify those particular areas using HUC nomenclature, but did provide geographic place names for those areas, including the names of freshwater rivers, the bypasses, the Sacramento-San Joaquin Delta, coastal bays and estuaries, and coastal marine areas (within 110 m depth) extending from the California/Mexico border north to Monterey Bay, California, and from the Alaska/Canada border northwest to the Bering Strait; and certain coastal bays and estuaries in California, Oregon, and Washington.

For southern DPS eulachon, critical habitat includes portions of 16 rivers and streams in California, Oregon, and Washington (USDC 2011). We designated all of these areas as migration and spawning habitat for this species.

A summary of the status of critical habitats, considered in this opinion, is provided in Table 1, below.

Table 1. Critical habitat, designation date, federal register citation and status summary for critical habitat

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Puget Sound Chinook salmon	9/02/05 70 FR 52630	Critical habitat for Puget Sound Chinook salmon includes 1,683 miles of streams, 41 square mile of lakes, and 2,182 miles of nearshore marine habitat in Puget Sounds. 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 eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value.
Southern DPS of green sturgeon	10/09/09 74 FR 52300	Critical habitat has been designated in coastal U.S. marine waters within 60 fathoms depth from Monterey Bay, California (including Monterey Bay), north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento River, lower Feather River, and lower Yuba River in California; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; tidally influenced areas of the Columbia River estuary from the mouth upstream to river mile 46; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor), including, but not limited to, areas upstream to the head of tide in various streams that drain into the bays, as listed in Table 1 in USDC (2009). The CHRT identified several activities that threaten the PBFs in coastal bays and estuaries and necessitate the need for special management considerations or protection. The application of pesticides is likely to adversely affect prey resources and water quality within the bays and estuaries, as well as the growth and reproductive health of Southern DPS green sturgeon through bioaccumulation. Other activities of concern include those that disturb bottom substrates, adversely affect prey resources, or degrade water quality through re-suspension of contaminated sediments. Of particular concern are activities that affect prey resources. Prey resources are affected by: commercial shipping and activities generating point source pollution and non-point source pollution that discharge contaminants and result in bioaccumulation of contaminants in green sturgeon; disposal of dredged materials that bury prey resources; and bottom trawl fisheries that disturb the bottom (but result in beneficial or adverse effects on prey resources for green sturgeon).

2.2.2 Status of the Species

Table 2, below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

Table 2. Listing classification and date, recovery plan reference, most recent status review, status summary, and limiting factors for each species considered in this opinion

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Chinook salmon	Threatened 6/28/05	Shared Strategy for Puget Sound 2007 NMFS 2006	NWFSC 2015	This ESU comprises 22 populations distributed over five geographic areas. Most populations within the ESU have declined in abundance over the past 7 to 10 years, with widespread negative trends in natural-origin spawner abundance, and hatchery-origin spawners present in high fractions in most populations outside of the Skagit watershed. 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.	• Degraded floodplain and in-river channel structure • Degraded estuarine conditions and loss of estuarine habitat • Degraded riparian areas and loss of in-river large woody debris • Excessive fine-grained sediment in spawning gravel • Degraded water quality and temperature • Degraded nearshore conditions • Impaired passage for migrating fish • Severely altered flow regime
Hood Canal summer-run chum	Threatened 6/28/05	Hood Canal Coordinating Council 2005 NMFS 2007	NWFSC 2015	This ESU is made up of two independent populations in one major population group. Natural-origin spawner abundance has increased since ESA-listing and spawning abundance targets in both populations have been met in some years. Productivity was quite low at the time of the last review, though rates have increased in the last five years, and have been greater than replacement rates in the past two years for both populations. However, productivity of individual spawning aggregates shows only two of eight aggregates have viable performance. Spatial structure and diversity viability parameters for each population have increased and nearly meet the viability criteria. Despite substantive gains towards meeting viability criteria in the Hood Canal and Strait of Juan de Fuca summer chum salmon populations, the ESU still does not meet all of the recovery criteria for population viability at this time.	• Reduced floodplain connectivity and function • Poor riparian condition • Loss of channel complexity Sediment accumulation Altered flows and water quality

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Steelhead	Threatened 5/11/07	In development	NWFSC 2015	This DPS comprises 32 populations. The DPS is currently at very low viability, with most of the 32 populations and all three population groups at low viability. Information considered during the most recent status review indicates that the biological risks faced by the Puget Sound Steelhead DPS have not substantively changed since the listing in 2007, or since the 2011 status review. Furthermore, the Puget Sound Steelhead TRT recently concluded that the DPS was at very low viability, as were all three of its constituent MPGs, and many of its 32 populations. In the near term, the outlook for environmental conditions affecting Puget Sound steelhead is not optimistic. While harvest and hatchery production of steelhead in Puget Sound are currently at low levels and are not likely to increase substantially in the foreseeable future, some recent environmental trends not favorable to Puget Sound steelhead survival and production are expected to continue.	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest • Threats to diversity posed by use of two hatchery steelhead stocks • Declining diversity in the DPS, including the uncertain but weak status of summer-run fish • A reduction in spatial structure • Reduced habitat quality • Urbanization • Dikes, hardening of banks with riprap, and channelization
Southern DPS of green sturgeon	Threatened 4/7/06	NMFS 2018	NMFS 2015c	The Sacramento River contains the only known green sturgeon spawning population in this DPS. The current estimate of spawning adult abundance is between 824-1,872 individuals. Telemetry data and genetic analyses suggest that Southern DPS green sturgeon generally occur from Graves Harbor, Alaska to Monterey Bay, California and, within this range, most frequently occur in coastal waters of Washington, Oregon, and Vancouver Island and near San Francisco and Monterey bays. Within the nearshore marine environment, tagging and fisheries data indicate that Northern and Southern DPS green sturgeon prefer marine waters of less than a depth of 110 meters.	• Reduction of its spawning area to a single known population • Lack of water quantity • Poor water quality • Poaching

2.3Action 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).

Terminal 3 has not been dredged since the previously authorized dredge event in 1978. Within those 40 years, sediment has accumulated in and around the berth and has shallowed the previously authorized dredge depth of -45 feet MLLW. The current mudline elevations throughout the berth area range from approximately -36 feet MLLW along the pier face, to approximately -45 to -46 feet MLLW at the north end of the berth. Vessel operators have been reporting frequent grounding issues to the Port, particularly along the pier face where almost 10 feet of recent sediment accumulation has shallowed the water depths. To provide an interim solution for this issue, the Port has placed logs against the fender piles to offset vessels waterward and obtain deeper draft during vessel loading.

The action area is determined by the greatest extent of effects stemming from the project; NMFS describes the action area as the area with elevated turbidity within a temporary area of mixing is approved during and immediately after permitted in-water construction activities that result in disturbance of sediments. The point of compliance for a temporary area of mixing shall be at a radius of 300 feet from the activity causing the turbidity exceedance. Thus, the action area is defined as aquatic areas within a 300-foot buffer of the dredged footprint (Figure 2). The spatial extent of the action area is 16.8 acres of aquatic habitat.

Figure 2. Illustration of Action Area incorporating Terminal 3 berth

2.4 Environmental Baseline

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 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Port of Port Angeles

Port Angeles is located on a natural harbor that is protected by the long sand spit of Ediz Hook curving east into the Strait of Juan de Fuca. The Port of Port Angeles owns approximately 35 acres of property in Port Angeles Harbor and manages the property for industrial, commercial, and recreational uses. The Port has provided facilities for handling logs transported from the Olympic Peninsula to the Puget Sound, along the West Coast and for export to Pacific Rim countries. In recent years, the Port has modernized its facilities and expanded its marine terminal services to handle a mix of bulk and break-bulk cargoes.

During its first several years, the Port acquired property along Port Angeles's waterfront. Part of this waterfront was made up of tidal flats not suitable for development, and it was necessary to fill them with dredged mud from the harbor before they could be developed. In 1926 the Port constructed of a 550-foot by 150-foot pier at the edge of Cedar Street and Port Angeles Harbor. The job was finished in 1927 and today the site is known as Terminal 1, or T-1. In 1971, the pier at Terminal 1 was extended and today is 1,100 feet long with remote dolphins, the longest of the port's terminals. It can berth ships up to 1,000 feet long, and has facilities for servicing ships requiring major repairs. The Port also operates four other terminals; all built after 1950, known as Terminals 2, 3, 4, and 7 (Figure 3). T-2 is currently leased to Blackball Transport, which uses it as the Port Angeles terminus for the MV Coho ferry that offers service between Port Angeles and Victoria, British Columbia. T-3 is the Port's primary cargo loading terminal. T-4 is currently leased to Arrow Marine Services. T-7 is designated as a lay berth facility.

Terminal 3 is on the Port-owned property, and is one of three industrial terminals to support the water-oriented industrial uses at the Port. Terminal 3 was constructed in 1966 for use as a log-handling pier, and was expanded in 1976. Terminal 3 continues to be the Port's primary cargo loading terminal and heavy lift pier. It is most frequently serviced by ocean log barges for the transport of forest products, but also handles general cargo.

Figure 3. Historical Photo of the Port of Port Angeles

As mentioned above, the vessel berth at Terminal 3 has not been dredged since the previously authorized dredge event in 1978. In the past 40 years, sediment has accumulated in and around the berth. Vessel operators have been reporting frequent grounding issues to the Port, particularly along the pier face where almost 10 feet of recent sediment accumulation has shallowed the water depths. To provide an interim solution for this issue, the Port has placed logs against the fender piles to offset vessels waterward and obtain deeper draft during vessel loading.

Historically, the Port leased much of its land to local businesses for handling and processing wood products. By 1950, the Port owned approximately 70 acres of industrial land that it leased to businesses such as Peninsula Plywood Corporation, Goodyear Nelson Company (manufacturers of fir and cedar lumber), and Port Tie and Lumber Company. In recent years, the Port's tenant base has expanded, and today the Port has more than 60 tenants offering a wide range of services such as topside repair, composite manufacturing, aviation components, commercial diving, and restaurants. Moreover, the Port collaborates with public and private entities to develop additional property and identify other opportunities to create job growth in Clallam County. Stormwater runoff from the Port of Port Angeles was influenced by the many industrial uses, and a pattern of water quality violations resulted in a Department of Ecology administrative order that the Port provide more treatment. The Port completed phase one in 2016, and NMFS consulted on phase two in 2018 (WCR–2018-8651).

Aquatic Substrate

Port Angeles Harbor has been used heavily for over the years to support industrial activities.

Contamination from sawmills, plywood, manufacturing, paper production, shipping and transport, boat building, bulk fuel facilities, marinas, and commercial fishing/processing have affected the aquatic substrate in the harbor which is currently ranked as an area of high concern for sediment contamination the State's Dredged Materials Management Program (DMMP) (Ecology 2012).

Substrate within Port Angeles Harbor is predominantly silty sand with intermixed gravels and shell hash in areas (Floyd Snider 2018). The Harbor is protected from strong currents by Ediz Hook, a large sand spit that extends from the shoreline, west of Terminal 3, into the Strait of Juan de Fuca to the north. By protecting the harbor from strong currents, a depositional "sink" is created in the inner harbor. This has resulted in a large proportion of fines within the generally silty/sandy substrate of the harbor. GeoSea (2009) reported fines comprised 71.1% (range 5.6% to 71.1 %, mean 56%) of substrate sampled adjacent to Terminal 3. Visual observations of core samples collected in 2017 were characterized as "silty sand with layers of 40 to 60 percent woody debris (up to 3 inches), with trace medium sand, gravel and shell hash. Fine wood fragments and vegetative material were observed in trace amounts in several of the cores. A sulfide-like odor was observed at the surface of all of the cores" (Floyd Snider 2018).

Wood storage and transport in the harbor has led to heavy deposition of wood debris in portions of the harbor. The largest amounts of wood debris have been observed along the western shoreline of the inner harbor and along the base of Ediz Hook (Ecology 2012). While large swaths of the harbor substrate to the west of Terminal 3 exhibit a heavy surface layer of wood debris (i.e., wood chips, bark, sawdust) and high wood content in subsurface samples, GeoSea (2009) identified "low to medium" surface cover at Terminal 3 and only trace amounts of wood were identified in subsurface samples (Ecology 2012).

Sediment habitat degradation by wood debris and the presence of metals and organic contaminants appear to be the critical stressors (Ecology 2012). Analysis of surface grab samples collected in 2008 from within the Terminal 3 dredge prism indicated no exceedances of DMMP criteria for the 53 standard DMMP chemicals of concern (E&E 2008). However, laboratory analysis of six core samples of the intended dredge prism collected at Terminal 3 in 2017 indicate that Tributyltin (TBT), polycyclic aromatic hydrocarbons (PAHs), and dioxin/furan TEQ exceeded DMMP screening levels for in-water disposal of dredged material (Floyd Snider 2018). Screening levels correspond to a concentration below which there is no reason to believe that dredged material disposal would result in unacceptable adverse effects. However, all dredged material will be disposed of upland; in-water disposal is not proposed. Core samples collected in 2017 by Floyd Snider were analyzed to assess the dredged material as well as the Z-layer; that layer that would be exposed to once dredging is completed.

Results of the analyses are provided in Figure 4. Laboratory analyses of Z-layer samples, representing the post-dredge surface were also conducted. Those results indicated that all analytes were either non-detect or detected at concentrations less than the DMMP screening level

(SL) and/or less than the concentrations detected in the dredge prism. Therefore, the Z-layer analyses complies with SMS anti-degradation guidance.

Analyte	Concentration	Comments
Conventional Analytes (total organic carbon, total sulfides)	TOC: 2.6% to 4.19% Sulfides: 763 to 2120 mg/kg	Slightly elevated total organic carbon and sulfide concentrations below DMMP screening levels.
Metals	Antimony, arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc were detected at low levels in all samples. Selenium was detected at a concentration of 3.16 mg/kg in one field duplicate sample.	High selenium concentration in one sample exceeded DMMP bioaccumulation trigger (BT) (i.e., 3.0 mg/kg). Selenium was detected at concentrations lower than BT levels in the Z-layer*. BT values are used as guidelines to determine when bioaccumulation testing is required.
Tributyltin	209 to 1530 µg/kg	Concentrations exceed DMMP BT (i.e., 73 µg /kg).
PAH	Numerous results. See Comment column.	PAHs were detected at concentrations greater than DMMP SL in all samples.
PCBs	Not detected in any samples.	Not detected in any samples.
Dioxins/Furans	10.2 to 16.1 parts per trillion (ppt)	All samples exceeded DMMP SL (i.e., 10 ppt).

*the z-layer is the sediment horizon that will be exposed after dredging is completed.

Figure 4. 2017 Core sample results

Aquatic Vegetation

Aquatic vegetation includes intertidal and subtidal species as well as floating and attached species. No aquatic vegetation has been identified at Terminal 3 during numerous surveys of Port Angeles Harbor. The nearest eelgrass and kelp beds are located along the southern shore of Ediz Hook, almost two miles northeast of the proposed dredging activities associated with Terminal 3. Furthermore, the dredge prism is between -35 feet MLLW and -45 feet MLLW. Eelgrass is not known to live below -32 feet MLLW in Puget Sound and the Strait of Juan de Fuca (Mumford 2007). Substrate within the dredge prism is not appropriate attachment habitat for kelp or other attached macroalgae, which require hard substrate such as bedrock or cobble.

Forage Fish

Forage fish are an important group of fish in the marine waters of Washington. Forage fish serve an important role as prey for a variety of marine animals, including birds, fish, and marine mammals. Pacific herring, surf smelt, and Pacific sand lance are the most common forage fish in Puget Sound. All three species are known to occur in Port Angeles Harbor.

Herring typically spawn in northern Puget Sound and the Strait of Juan de Fuca occurs from late January through early April (Bargmann 1998). Herring deposit their transparent eggs on intertidal and shallow subtidal eelgrass and marine algae. Although no herring spawning locations have been documented in the harbor (WDFW 2018), juvenile herring have been caught during seining just off Ediz Hook (Shaffer and Galuska 2009). No appropriate spawning habitat exists in the action area.

Surf smelt are most abundant in the Port Angeles Harbor in late spring through summer but spawn throughout the year, with the heaviest spawn occurring from mid-October through December.

Sand lance spawning typically occurs from early November through mid-February. They deposit eggs on a range of nearshore substrates, from soft, pure, fine sand beaches to beaches armored with gravel (Bargmann 1998). Bargmann (1998) indicates that 35 percent of all juvenile salmon diets and 60 percent of the juvenile Chinook diet, in particular, are sand lance. The closest documented sand lance spawning area is a 1,000- foot-long area on the south side of Ediz Hook, nearly 2 miles north of the action area. Adult, juvenile, and larval sand lance are expected to be present within Port Angeles Harbor throughout the year.

<u>Water Quality</u>

Water quality in Port Angeles Harbor is generally considered good. While a number of industrial properties historically released effluents into the harbor that may have had negative effects on water quality, the Washington State Department of Ecology (Ecology) and others are actively undertaking cleanup of those properties. Additionally, implementation of the National Pollution Discharge Elimination System has reduced the amount of contamination flowing into the harbor. Ecology's Water Quality Status Report does identify several Category 5 ratings ("polluted waters that require a water improvement project") in Port Angeles Harbor (Ecology 2018). Water in the western harbor has a Category 5 rating due to low dissolved oxygen (DO) levels, likely due to decaying wood debris in this area. Water in the southern harbor, to the east of the Project has a Category 5 rating due to the occasional presence of enterococcus and fecal coliform bacteria from sewer overflows (Ecology 2018, U.S. Navy 2015). Port Angeles Harbor was listed on the Department of Ecology's 303(d) list of impaired waters for bacterial exceedances in 2012 (Ecology 2018).

Water quality in the harbor is strongly tied to water quality in the Strait of Juan de Fuca. A monthly comparison of water quality parameters (temperature, salinity, DO) indicate that conditions in the harbor closely match conditions of the waters of the greater Strait of Juan de Fuca. Temperatures were slightly higher in the harbor in late summer and salinity inside the harbor was higher during the winter but lower during the fall (Ebbesmeyer et al 1979). Given the proximity to the open ocean and the opportunity for thorough mixing, water quality in the Strait of Juan de Fuca is considered naturally pristine. The difference in temperature between the harbor and the Strait of Juan de Fuca can be attributed to the protection from currents afforded by Ediz Hook, which increases the residence time of water in the harbor. Differences in salinity can be attributed to increased freshwater run-off in the fall due to increased precipitation.

Port Angeles Urban Watersheds

Water quality in the action area is affected by upland activities. The streams within the Port Angeles urban area include Ennis Creek, Peabody Creek, Valley Creek, Tumwater Creek, and Dry Creek. Creeks near the action area include Tumwater Creek and Valley Creek (Figure 5). Both creeks exit through culverted lower reaches under the central downtown area into Port Angeles Harbor. The Port Angeles urban streams have been viewed as "impediments to development" of the urban Port Angeles area. Drainage patterns have been changed, channels have been straightened, numerous road fills and culverts have been placed, etc. Some streams are actively used for sewage disposal and as stormwater conduits.

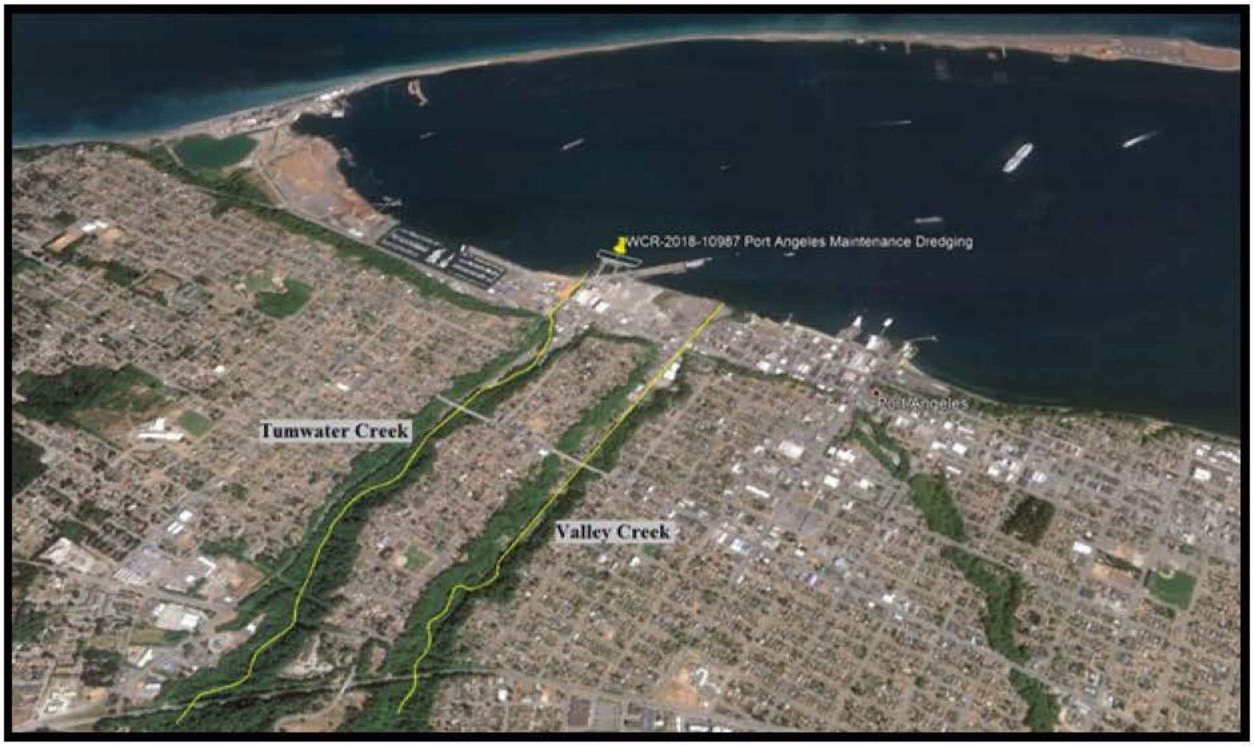

Figure 5. Aerial photo of creeks flowing into Port Angeles Harbor

Valley Creek

The Valley Creek watershed is approximately four-square miles in size, with headwaters in the lower foothills at the northern boundary of Olympic National Park (Economic and Engineering Services, Inc. 1996). Sixty percent of the watershed is in urban land use, with 50% of that land in impervious surface. Valley Creek has been significantly altered to accommodate urban and industrial development in Port Angeles, and is heavily impacted by stormwater runoff from the urban and industrial development. The drainage network is poorly integrated. The stream has been channelized, and is constrained next to a paved road that parallels the stream along the valley floor. Though lower Valley Creek does not currently have any kind of well-preserved green-belt corridor protecting the stream, above Highway 101 it lies within a green-belt corridor that provides some protection for the near-stream environment—with much of the riparian zone in City and County ownership. The lowland subwatersheds of these streams have experienced considerable clear-cutting and development.

Valley Creeks gradient and proximity to Port Angeles Harbor suggest that this drainage probably supported steelhead, coho, and chum salmon (McHenry 1996). Chum have been extirpated and coho and steelhead productivity is currently judged to be low, and with a limited potential for improvement due to urban and industrial development in the lower watershed, rural development in the upper watershed, and stormwater impacts. Nonetheless, there remains a strong local community effort to restore Valley Creek as fully as possible. Live trapping associated with stream restoration work conducted in summer, 2002 revealed about 300 coho and 600 resident cutthroat within a 1000-foot section of the creek just downstream of the Hwy. 101 culvert.

Indigenous Fish Distribution, Abundance & Status:

Chinook salmon
Not historically or currently present in this watershed.

Coho salmon
Valley Creek continues to support a population of Morse Creek coho, which does not demonstrate unique temporal or biological characteristics. Significant portions of these may be the result of heavy planting of hatchery coho. Spawning has been known to occur in Valley Creek (to RM 1.2). The stock status of Morse Creek coho is designated in the Salmon and Steelhead Stock Inventory (SASSI) as depressed (Haring 1999).

Chum salmon
Fall chum were known in small runs historically. The group is documented as “present” in the WDFW SalmonScape[1].

Pink salmon
Not historically or currently present in this watershed.

Steelhead
Valley Creek is known as supporting steelhead but it is not specifically noted in SASSI. Their status here is generally unknown, with little current or historic data available on steelhead production. Limited smolt trapping data are available for Valley Creek. The spawning distribution in Valley Creek is thought to be the same as for coho, up to Highway 101 at RM 1.2 (Haring 1999). SalmonScape notes presence of summer and winter steelhead in Valley Creek[1].

Tumwater Creek
The Tumwater Creek watershed is approximately six square miles in size, with headwaters in the lower foothills at the northern boundary of Olympic National Park. The upper portion of the watershed has been modified by past and ongoing forest harvest, with a mosaic of timber age and altered hydrologic character. The central and lower portions of the stream have been modified by residential, agricultural, road, and commercial/industrial development (Economic and Engineering Services, Inc. 1996). Tumwater Creek is heavily impacted by urban and industrial development in the lower reaches. Rural development and impacts of stormwater runoff have created serious habitat problems throughout the watershed. Rural development and impacts of stormwater runoff have created serious habitat problems throughout the watershed.

Tumwater Creek is very similar to Valley Creek. Urbanization is very evident within the coastal lowland subwatershed of Tumwater Creek. Virtually the entire subwatershed has been developed, with very little undeveloped area remaining, except within the narrow riparian corridor along the stream. Within the coastal lowland subwatershed areas of the streams, Tumwater Creek does not have a well-preserved green-belt corridor protecting the stream. Somewhat above Highway 101, Tumwater Creek lies within a green-belt corridor that provides some protection for the near-stream environment (Perry 2001).

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[1] http://apps.wdfw.wa.gov/salmonscape/map html

Tumwater Creek is classified as a Class A water body. It is adversely affected by altered hydrology and other water quality impacts from stormwater runoff, but the high sediment load from the massive stormwater related headcut off Black Diamond Road masks the effects. Other water quality concerns include stormwater impacts from both Highway 101 and the Highway 101 truck route.

Haring (1999) and NOPLE (2001) indicate that Tumwater Creek historically has supported populations of chum (fall), coho (not specifically designated as a distinct stock or associated with either Elwha or Morse Creek stocks) and winter steelhead. Chum have been extirpated and coho and steelhead productivity is currently limited. Smolt trapping conducted in 1998 yielded only 119 and 320 coho and steelhead smolts, respectively. Current productivity is judged low, and with a limited potential for improvement due to urban and industrial development in the lower watershed, rural development in the upper watershed, stormwater impacts, and sediment from the massive erosion feature at about RM 4.

Indigenous Fish Distribution, Abundance & Status:

Chinook salmon
Not historically or currently present in this watershed.

Coho salmon
Tumwater Creek continues to support a population of Morse Creek coho, which does not demonstrate unique temporal or biological characteristics. Significant portions of these may be the result of heavy planting of hatchery coho. Spawning is known to occur in Tumwater Creek (to RM 2.5). The stock status of Morse Creek coho is designated in SASSI as depressed (Haring 1999).

Chum salmon
Fall chum were known in small runs historically. The group is documented as "present" in the WDFW SalmonScape[2].

Pink salmon
Not historically or currently present in this watershed.

Steelhead
Tumwater Creek is known as supporting steelhead but it is not specifically noted in SASSI (WDF et al. 1994). Their status here is generally unknown, with little current or historic data available on steelhead production. Spawning distribution in Tumwater Creek is thought to be the same as for coho, extending from the mouth to at least the power line crossing at RM 2.3. SalmonScape notes presence of summer and winter steelhead in Valley Creek[2].

[2] http://apps.wdfw.wa.gov/salmonscape/map html

Baseline Summary of habitat and species in the action area

The action area is a marine area within Port Angeles Harbor, with multiple degraded habitat conditions that influence fish presence and carrying capacity. Water quality is good in some locations, but also impaired in others, including poor dissolved oxygen as a result of sediment being intermixed with high amounts of woodwaste. Bathymetry and nearshore conditions have been modified by dredging, filling, and structures to aid commercial navigation, which have reduced subaquatic vegetation that provide salmonid cover, and reduced benthic communities that provide salmonid and sturgeon forage. Streams that flow into the harbor have been impacted by surrounding urban development and fish use of the streams is now limited. The species and populations most likely to be present as a result are limited to Puget Sound steelhead (Dungeness River summer/winter run, Strait of Juan de Fuca Independent Tributaries winter run, and the Elwha River winter run, and steelhead from Tumwater and Valley Creeks), coho salmon of the Morse Creek population (coho are an EFH species, see section 3 below), Hood Canal Summer run chum (from all populations), and Puget Sound Chinook (Dungeness River and Elwha River populations), and southern DPS green sturgeon (no population information).

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

All effects associated with the proposed action are temporary. The assessment below considers the intensity of expected effects in terms of the change they would cause on habitat features from their baseline conditions, and the severity of each effect, considered in terms of the time required to recover from the effect. Ephemeral effects are those that are likely to last for hours or days, short-term effects would likely to last for weeks, and long-term effects are likely to last for months, years or decades.

Temporary effects include disturbance of bottom sediments, which will cause water quality impacts, and disturbance of benthic communities (forage).

Water Quality
Water quality is an essential element of both the rearing and migration PBFs, and is likely to be affected during dredging. Dredging operations are to be completed using mechanical (clamshell) dredging methods of approximately 2.5 acres of subtidal material for up to 30 days within the in-water work window (July 16 to February 15) either during the 2019/2020 or 2020/2021 construction seasons. Effects to water quality due to dredging can include increased suspended sediments leading to increased turbidity, decreased dissolved oxygen (DO), or resuspended toxins.

Turbidity: Temporary and localized increases in turbidity are expected in the immediate vicinity of the clamshell but water quality monitoring at the point of compliance (i.e., 300 feet from dredging activity) during dredging is intended to ensure that effects are localized in order to minimize potential effects.

Dissolved oxygen: Suspension of anoxic sediment compounds during dredging can result in reduced DO in the water column as the sediments oxidize. Sub-lethal effects of DO levels below saturation can include metabolic, feeding, growth, behavioral, and productivity effects. Behavior responses can include avoidance and migration disruption (NMFS 2005a).

Based on a review of six studies on the effects of dredging on DO levels, LaSalle (1988) concluded that, considering the relatively low levels of suspended material generated by dredging operations and counterbalancing factors such as flushing, DO depletion around dredging activities is minimal. In addition, when DO depletion is observed near dredging activities, it usually occurs in the lower water column, whereas juvenile salmon are more closely associated with the upper water column. A number of other studies reviewed by LaSalle (1988) showed little or no measurable reduction in DO around dredging operations. Simenstad (1988) concluded that because high sediment biological oxygen demand is not common, significant depletion of DO is usually not a factor in dredging operations. A model created by LaSalle (1988) demonstrated that, even in a situation where the upper limit of expected suspended sediment is reached during dredging operations, DO depletion of no more than 0.1 mg/L would occur at depth. Any reduction in DO beyond background should be limited in extent and temporary in nature. Additionally, the short duration of the project (i.e. on month) further reduces the potential for effects of low DO due to turbidity and suspended sediment.

Resuspended toxins: During dredging, PAHs, and other contaminants will be re-suspended in the water column during and immediately following dredging. However, the probability of exposure of individuals to water quality effects is generally low, given that the work windows would mostly preclude the presence of juveniles, and BMPs will be implemented to minimize the mobilization of sediments (e.g., clamshell dredge, sediment reduction devices on barge scuppers). Short-term and intermittent exposure to reduced water quality could result in minor reductions in foraging success, gill damage and/or sublethal toxicity within 300 feet of dredging activities.

Over the long term, removal of this sediment is expected to provide a net beneficial effect, by improving water quality for ESA listed species and their prey by decreasing dioxin/furan concentrations in the water column. Removal of dioxins/furans from the environment is especially important for SRKW, which, as long-lived apex predators, accumulate persistent toxins, which are passed across trophic levels and concentrated at the top of the food chain.

Benthic Communities and Forage Species Disturbance

Sessile, benthic, and epibenthic organisms within the sediments of the dredge prism that cannot move fast enough to avoid the capture of sediment by the clamshell bucket are entrained and experience high mortalities. Several studies have demonstrated that benthic organisms rapidly recolonize habitats disturbed by dredging (McCabe et al. 1996; Quian et al. 2003; Richardson et al. 1977; Van Dolah et al. 1984). However, 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). The species of invertebrates adapted to the high-energy, shifting sediments of Port Angeles Harbor are expected to quickly recolonize areas of disturbance such as occurs during dredging. The infaunal community in the harbor would experience disruption during dredging and for a short time after, expected to recover toward baseline levels within several several months, but full recruitment of prey complexity and abundance may take up to 3 years, at most. Suspended sediment tolerance generally decreases with increasing temperature or decreasing dissolved oxygen, and the combination of summer temperature and low dissolved oxygen is particularly adverse to benthic prey communities. Where DO is low, effects can persist for many weeks (WES 1978). TBT is used in many of the world's marine paints to reduce growth and accumulation of crustaceans and algae on ships. TBT is harmful to crustaceans in low concentrations. It has been shown that TBT contamination causes shell thickening and deformation in adult oysters (*Crassostrea gigas*) and reduces larval success. TBT also causes imposex (growth of male reproductive organs on female organisms) in many crustaceans (Alzieu 2000). TBT, which can be resuspended during dredging, is highly toxic to benthic invertebrates.

2.5.1 Effects on Critical Habitat

As mentioned in Section 2.2.1, critical habitat for PS chinook and southern DPS green sturgeon occur within the action. The NMFS reviews effects on critical habitat affected by a proposed action by examining how the PBFs of critical habitat will be altered, and the duration of such changes.

Chinook Critical Habitat:

The NMFS reviews the effects on critical habitat affected by the proposed action by examining changes of the project to the condition and trends of physical and biological features identified as essential to the conservation of the listed species. In estuarine and nearshore marine areas critical habitat is proposed to include areas contiguous with the shoreline from the line of extreme high water out to a depth no greater than 30 meters (90 feet) relative to mean lower low water. The salmonid PBFs present in the action area are presented below, with the affected features in bold:

> Nearshore marine areas (free of obstruction and excessive predation with (1) **water** quality and **quantity conditions and foraging opportunities, including aquatic invertebrates and fishes, supporting growth and maturation**, and (2) natural cover including submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

The project will cause temporary effects to habitat features for Chinook salmon. Those effects are:

1. Water Quality/Turbidity and Suspended Solids - Dredging will degrade water quality in the berth and a 300 foot area surrounding the berth by elevating suspended sediments for up to 30 days within the in-water work window, and which will return to baseline levels within hours after work ceases. Conditions for migration and forage will be disrupted by the water quality degradation.

2. Water Quality/Pollutants – Increased levels of PAHs, and other contaminants re-suspended in the water column during and immediately following dredging will co-occur with the dredging. This aspect of water quality degradation is unlikely to create additional impairment of migration value of CH, but could incrementally impair forage/prey communities that are exposed to the contaminants, delaying the speed that these communities re-establish.

3. Forage and Prey/Reduced prey abundance from dredging. Short-term and intermittent exposure to reduced water quality could result in minor reductions in foraging base, gill damage of forage fishes, and/or sublethal toxicity of benthic prey species within 300 feet of dredging activities. The limited duration of the inwater dredging (30 days within the in-water work window), and low intensity of these effects, and the prompt return to baseline levels (expected to be several months), indicate that the prey reduction are insignificant to conservation values to the marine critical habitat in the action area.

Green Sturgeon Critical Habitat:

PBFs essential for the southern DPS of green sturgeon habitat present in the action area (nearshore coastal marine area) are presented below, with the affected features in bold:

> Nearshore coastal marine areas with **migratory pathway necessary for the safe and timely passage** of all life stages within marine and between estuarine and marine habitats. Nearshore waters with adequate **water quality including sufficient DO and low enough levels of contaminants to allow for normal behavior, growth and viability. Abundant prey items for subadults and adults potentially including benthic invertebrate fishes.** (74 FR 52325; 10/09/2009).

The project will cause temporary effects to habitat features for green sturgeon. Those effects are:

1. Prey –Prey will be reduced in the action area by dredging which will disrupt and remove prey, and by their exposure to chemical contaminants which may delay the rate of return of the prey communities back to their baseline level. However, the affected area constitutes a small part to the total forage habitat available to green sturgeon in the area, and the impact would occur in an area where green sturgeon are less likely to feed, since sturgeon have a preference for deeper areas. Finally, the duration of impact to this PBF is expected to be a few months, but perhaps up to 3 years at most, to re-establish full complexity and abundance of prey. Therefore, the effect on this PBF's ability to support green sturgeon is considered moderate in duration, but given the general availability of suitable prey base, this temporary diminishment is unlikely to impair the overall function of this PBF.

2. Migratory corridor – The proposed work is likely to experience reduced water quality which may briefly inhibit migration in that area when and where work is occurring. Because the affected/disturbed areas would be very small in footprint, not in a location that sturgeon would use for migration between marine and estuarine environments, would not preclude species movement around the work area, and will persist only while work

occurs, the action would cause no meaningful detriment on this. Therefore, the action would cause only insignificant changes in the quality and function of this PBF.

3. Water quality –Maintenance dredging will impair water quality for roughly 30 days within the in-water work window. It would cause no measurable changes in-water temperature and salinity, but would periodically mobilize contaminants and suspended sediments into the water column, and may also periodically 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, the effects will not significantly impair this PBF for green sturgeon.

Critical Habitat Summary. For all designated critical habitats, the effects of the proposed action include the temporary disturbance from the dredge in the migratory corridor, degradation of water clarity as fine sediments are resuspended, and reduction in quantity of food organisms and benthic productivity. The proposed action will not cause any significant loss of critical habitat quality with the action area, as all features are affected in a limited footprint, and will return to baseline level within hours (water quality, migration) or weeks to months at most (prey communities).

2.5.2 Effects on Species

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, PS steelhead, Hood Canal summer-run chum, and southern green sturgeon will be exposed to **modified benthic prey**, and temporary **diminishment of water quality** from elevated suspended sediment and contaminants. **Entrainment** 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 or disposal.

2.5.2.1 Species Presence and Exposure

Each of the following species uses the action area with variable presence. In order to determine effects on species, we must evaluate when species will be present and the nature (duration and intensity) of their exposure to those effects of the action in their habitat, which were described above. It should be noted; an effect exists even if only one individual or habitat segment may be affected (Fish and Wildlife Service and the National Marine Fisheries Service 1998). Dredging work is expected to take up to 30 days, and is allowed to occur at anytime within the July 16 to February 15 work window. Life history behaviors influence which life stages could be present during that work window.

Puget Sound Chinook Salmon
The Dungeness River and Elwha River are the nearest rivers to the action area that support independent populations.

The Elwha River population is believed to be comprised of two subpopulations: an early and a late returning run. Chinook return to the Elwha River from late spring through late-September and spawn from late-August through mid-October (Puget Sound Indian Tribes and WDFW 2004). After hatching, Chinook fry emigrate from their natal rivers and congregate in nearshore areas prior to their offshore migration to feed in open water (Nightingale and Simenstad 2001). Smaller outmigrants tend to migrate in the upper few feet of the water column along nearshore areas and use river deltas and pocket estuaries as rearing areas (Beamer et al. 2003). Larger outmigrants are not as strongly associated with the nearshore.

The Dungeness River population is comprised of a single population of native origin fish with spring/summer-run timing. Chinook return to the Dungeness River in the late spring to midsummer, with spawning occurring in early August through early October. Fry emerge in the early spring with a majority emigrating to rear in the estuary during their first year of life, while remaining fry will rear in the river for a year and emigrate out as yearlings. Fish spend the first year of their life within estuarine nearshore habitat (Puget Sound Indian Tribes and WDFW 2004), which makes exposure among juveniles likely.

Individuals of both the Elwha and Dungeness populations likely occur in the action area. During nearshore surveys conducted from 2006 through 2014 near the action area, Chinook salmon were recorded from April to September (Fresh 2015), which overlaps with roughly half of the work window.

Adult PS Chinook may migrate near the action area between April and October which overlaps with a substantial portion of the work window. Fry will emerge around February avoiding the work window.

Puget Sound Steelhead
Of the 32 independent populations of the PS steelhead DPS, three may occur in the vicinity of the action area. These include the Dungeness River summer/winter run, Strait of Juan de Fuca Independent Tributaries winter run, and the Elwha River winter run (PSSTRT 2013). The Dungeness River summer/winter-run population spawns in the mainstem of the Dungeness and Grey Wolf rivers. Historical records indicate the presence of summer-run steelhead in the 1940s but further monitoring is needed to determine if they are still present in the basin. Within the Dungeness River, spawning typically occurs from mid-March to early June. Genetically, the Dungeness River steelhead most closely cluster with other collections from the Strait of Juan de Fuca and Elwha River populations (PSSTRT 2013).

As noted in Section 2.4 above, there are two steelhead natal rivers near the action area, Valley Creek and Tumwater Creek. Valley Creek is known as supporting steelhead but it is not specifically noted in SASSI (WDF et al. 1994). The spawning distribution in Valley Creek is thought to be up to Highway 101 at RM 1.2 (Haring 1999). SalmonScape notes presence of summer and winter steelhead in Valley Creek. Tumwater Creek is known as supporting steelhead but it is not specifically noted in SASSI (WDF et al. 1994). Spawning distribution in Tumwater Creek is thought to extend from the mouth to at least the power line crossing at RM 2.3. SalmonScape notes presence of summer and winter steelhead in Valley Creek.

Adult steelhead may migrate near the action area between November and April, which overlaps with a substantial portion of the work window.

Hood Canal Summer-Run Chum Salmon
The Hood Canal summer-run chum ESU includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries, as well as populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington. Eight artificial propagation programs are also considered to be part of this ESU (NMFS 2005b).

There are two designated independent populations of Hood Canal summer-run chum ESU: one that includes spawning aggregations in Hood Canal and one that includes the spawning aggregations from rivers and creeks draining into the Strait of Juan de Fuca (Ford 2011). The Strait of Juan de Fuca summer chum population is composed of five spawning aggregations (Dungeness River, Jimmycomelately Creek, Salmon Creek, Snow Creek, and Chimacum Creek). Summer chum enter the Dungeness River in late August through late October and spawn in the main channel through September. Eggs incubate in redds for 5 to 6 months and fry emerge between January and May. Typical of chum salmon, fry migrate rapidly downstream and out to the estuary and nearshore areas (NMFS 2005b).

During nearshore surveys conducted from 2006 through 2014, juvenile chum salmon were recorded from April through September, with higher abundances during the spring months (April - June) (Fresh 2015). Adult summer-run chum may migrate near the action area between August through October, which occurs fully within the work window.

Green sturgeon
The North American green sturgeon southern DPS was listed under the ESA as threatened in April 2006 (NMFS 2006). This DPS includes all green sturgeon originating from the Sacramento River basin and from coastal rivers south of the Eel River in northern California Green sturgeon utilize both freshwater and saltwater habitat. Adults live in oceanic waters, bays, and estuaries when not spawning. Green sturgeon are known to forage in estuaries and bays ranging from San Francisco Bay to British Columbia. Although spawning does not occur in tributaries to the Strait of Juan de Fuca (NMFS 2014), green sturgeon may forage in the action area.

Subadult and adult green sturgeon make annual migrations along the coast in the spring and fall, spending winters in the marine waters north of Vancouver Island and south of southeast Alaska, and summers in coastal waters, bays, and estuaries of Washington, Oregon, and California. Sturgeon have been observed on a southward migration within the Strait of Juan de Fuca waters during summer. It is assumed that most green sturgeon migrating between Canadian and U.S. waters cross the Strait of Juan de Fuca over deep water to the west of the Strait of Juan de Fuca line (Lindley et al. 2008). Though not common in within Port Angeles Harbor, green sturgeon might use the area as refuge while in transit to its northern and southern locations. For this assessment we will conservatively assume green sturgeon could be present in the action area during work.

2.5.2.2 Species Response to Temporary Effects

Modified Benthic Prey

Prey communities will be reduced in the action area and are expected to recolonized the dredge footprint with weeks to months. Salmonids and green sturgeon present in the action area would experience reduced forage opportunity.

Salmon: When juvenile salmonids are entering the nearshore or marine environment, they must have abundant prey to allow their growth, development, maturation, and overall fitness. As dredging dislodges bottom sediments, benthic communities are disrupted where the sediment removal occurs and in the locations where sediment falls out of suspension and layers on top of adjacent benthic areas. Benthic communities will be impacted over approximately 16.8 acres and it can take up to three years to fully re-establish their former abundance and diversity. Given that the work will occur across one work window, we can expect three years in which benthic prey is less available to juveniles, incrementally diminishing the growth and fitness of four separate cohorts of individual juvenile outmigrants from the ESA listed salmonid species that pass through the action area. Given the relatively small area (16.8 acres) from within available prey sources in the harbor, and the high level of mobility that juvenile migrants have when they reach the marine environment, that many individual fish will experience reduce food or increased competition to a degree that impairs their growth, fitness, or survival. Even if several fish from each cohort of each population had diminished foraging success, we anticipate that this would be a transitory condition as they migrate to more suitable forage locations. The level of reduced growth, fitness, or survival would be impossible to detect numerically, and the reduced abundance in juvenile cohorts would probably be insufficient to be discerned as an influence on productivity of the populations.

Green sturgeon: Southern green sturgeon will experience temporary reduction of available forage/prey abundance in the 16.8 acre area where dredging occurs and sediment will fall. However, the areas to be dredged represent a fraction of available forage habitat in the bay, because green sturgeon prefer deeper water and can forage from the benthic communities in a much larger portion of the harbor, relative to salmonids. As such, the dredging and dredge material disposal are not expected to limit foraging opportunities for green sturgeon., and no individuals would experience reduced growth, or fitness as a result of the small decrease in prey abundance, even if such a decrease persisted for 3 years.

Diminished Water Quality

Exposure to water of degraded quality is likely to adversely affect adult PS chinook, adult PS steelhead, adult and juvenile Hood Canal summer-run chum, and adult and sub-adult green sturgeon. Water quality will be impaired for roughly 30 days by suspended sediments and suspended contaminants.

Suspended sediment

The effects of suspended sediment on fish increase in severity with sediment concentration and exposure time and can progressively include behavioral avoidance and/or disorientation, physiological stress (e.g., coughing), gill abrasion, and death—at extremely high concentrations. Newcombe and Jensen (1996) analyzed numerous reports on documented fish responses to suspended sediment in streams and estuaries and identified a scale of ill effects based on sediment concentration and duration of exposure, or dose. Exposure to concentrations of suspended sediments expected during dredging could elicit sub-lethal effects such as a short-term reduction in feeding rate or success, or minor physiological stress such as coughing or increased respiration.

Salmon: Several reports summarized dredged material behavior and sediment resuspension due to clamshell dredging and associated open water disposal (Palermo et al. 2009; LaSalle et al. 1991; Havis 1988; McLellan et al. 1989; Herbich and Brahme 1991; Truitt 1988). 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). Based on an evaluation of seven clamshell dredge operations in fine silt or clay substrates, LaSalle (1991) determined that the expected concentrations of silty suspended sediment levels was 700 mg/l and 1,100 mg/l at the surface and bottom of the water column, respectively (within approximately 300 feet of the operation). Sediment in the action area consists of silty sands which would settle out of the water column faster than fine silt or clay. Suspended sediment from the proposed dredge operations is expected to not reach levels leading to injure exposed fishes because salmonids are expected to avoid or promptly vacate areas where sediment concentrations are high enough to cause injury. Studies show that salmonids have an ability to detect and distinguish turbidity and other water quality gradients (Quinn, 2005; Simenstad, 1988). Also by the time juvenile salmonids are in the marine environment we expect them to be large that even with exposure, injury will not result as studies have shown that larger juvenile salmonids are more tolerant to suspended sediment than smaller juveniles (Servizi and Martens, 1991; Newcombe and Jensen, 1996). Thus, behavioral responses and perhaps cough are the most likely responses, and harm is unlikely to result. Based on life history behaviors and work window timing, the overlap of adult Chinook with potential in-water work is only 3 months, juvenile and adult chum presence is 3 months, but steelhead presence and the work window overlap by 5 months.

Green Sturgeon: Green sturgeon are relatively tolerant of elevated suspended sediment. They are typically found in turbid conditions, and they forage by stirring up sediments to access benthic prey such as burrowing shrimp. Further, Wilkens et al. (2015) experimentally demonstrated that the closely related Atlantic sturgeon experience no significant effects from three days of continuous exposure to suspended sediment concentrations of up 500 mg/L.

Suspended contaminants

Due to the highly industrialized nature of the project area, numerous sites containing hazardous substances exist in and near the project area. Contaminants in sediments and dissolved in-water can have varying levels of toxicity, most often occurring as sub-lethal effects. Sediment sampling and characterization by Floyd Snider (2018) indicate that concentrations of conventional analytes (total organic carbon, total sulfides), metals, and PCBs were below DMMP screening levels. Screening levels are those concentrations below which there is little reason to believe that dredged material disposal would result in unacceptable adverse effects (DMMP 2013), so effects of these contaminants will not be assessed further in this document. Concentrations of TBT, P AHs, and dioxins/furans exceeded screening levels, so their potential effects are discussed in more detail below. Based on a preliminary analysis, chemicals of concern in the dredging area may contain TBT, PAHs, and dioxins/furans. Some of the effects of these contaminants to salmon species include:

- Vertebrate organisms are generally capable of metabolizing TBT and do not show the same extreme toxicity outcomes at low concentrations. TBT has a low water solubility and will bind strongly to suspended material and precipitate to bottom sediments. Inorganic tin compounds are of low toxicological risk to fishes due largely to their low solubility, poor absorption, low accumulations in tissues, and rapid excretion (Eisler 1989).

- Sublethal effects to fish include external injury such as damage to the skin, fins, and eyes as well as internal organ problems such as liver tumors from exposure to PAH-contaminated sediments and water. Gill tissues are highly susceptible to damage because they actively pass large volumes of water and are thereby exposed to PAHs present in water (SHNIP 2016). Most non-benthic fish tissue contains relatively low concentrations of PAH, and accumulation is usually short term because these organisms can rapidly metabolize and excrete them (Lawrence and Weber 1984 and West et al. 1984 as cited in Eisler 1987).

- Many studies have reported the nature of PAHs in the aquatic environment and their metabolism in fish. Fish exposure to PAHs has been linked to a wide range of physiological dysfunctions in fish, including neoplasia, endocrine disruption, immunotoxicity, reduced reproductive success, embryonic development, post-larval growth, and transgenerational impacts (Tierney et al. 2014).

- Exposure of fish to PAHs is generally associated with narcosis, resulting in a general depression of biological and physiological activities (Van Brummelen et al. 1998). These effects may be linked to reduced immune function, increased mortality after disease challenge, and reduced growth (Karrow et al. 1999; Varanasi et al. 1989; Arkoosh et al. 1991, 1998).

- Dioxin and dioxin-like PCBs act similarly on salmon and other fish species. Reported effects on juvenile salmon include a wide range of sub-lethal outcome including impaired growth and reproduction, hormonal alterations, enzyme induction, alterations to behavior patterns, and mutagenicity (Meador 2002, SHNIP 2016). Eisler (1986) stated that in general, toxicity increased with increasing exposure, crustaceans and younger developmental stages were the most sensitive groups tested, and lower chlorinated biphenyls were more toxic than higher chlorinated biphenyls.

- Exposure to dioxin can result in developmental or reproductive toxicity in fish, birds, and mammals. Fish larvae are among the most sensitive vertebrates to the toxic effects of dioxins/furans (Peterson et al., 1993); and exhibit similar signs of toxicity as other vertebrates including decreased food intake, wasting syndrome, and delayed mortality. Adult fish are less susceptible to dioxin-induced toxicity compared to earlier life stages, requiring considerably higher body burdens to elicit adverse effects (Lanham et al. 2011; Peterson et al. 1993; Walker and Peterson 1992, Walker et al. 1994).

Resuspension of contaminated sediments are proportional to the amount of dredging and the local levels of contamination. Assuming a three percent sediment resuspension rate (SHNIP 2016), approximately 390 cubic yards of material will be resuspended during the course of dredging. In addition, disturbance of the substrate will increase contaminant concentrations by resuspending particulates, thereby allowing more contaminants to transport into the water column. However, measures to limit suspended sediment, such as the dredging techniques, will reduce disturbance of substrate particles and contaminants (SHNIP 2016). Contaminant concentrations will be increased for up to 30 days during the work window (July 16 to February 15), with potentially harmful acute increases contained within the 300-foot compliance boundary. Which species and lifestages have the most exposure will be determined by the actual dates of in-water work, which at this time is unspecified. Ultimately, once the contaminated sediment has been removed, the concentration of contaminated material in the surrounding environment will decrease and the pathway of exposure for fish through contamination of prey will be reduced in perpetuity.

Salmon: Adult Chinook salmon migrate to nearby rivers from late spring through late September. Similarly, adult steelhead may migrate near the action area between November and April. PAHs have been found to reduce fitness and have potential to kill juvenile salmonids through the effect of "toxicant-induced starvation" in which lipid stores and biomass are reduced (Meador et al. 2006). Impacts of PAHs on the reproduction and development of wild Puget Sound salmon have not been well characterized, although some laboratory studies have shown abnormal behavioral effects during early development of coho salmon exposed to PAHs (Ostrander et al. 1988). Dioxin exposure can cause detrimental but sublethal effects, described above, among juvenile salmonids. Dioxin toxicity varies dramatically across fish species with salmonids exhibiting the highest sensitivity. Recent studies have shown negative effects to eggs and fry but little is known about toxicity levels to adult salmonids that might be found in the action area (King-Heiden et al. 2011). The period of potential exposure to these contaminants is during the 30 days of dredging.

Sturgeon: Because sturgeon that could be present would be sub-adults and adults, in the event that sturgeon were to enter the turbidity plume to forage levels of contaminant exposure, even up to 30 days within the in-water work window, would probably not be high enough to cause direct cytotoxicity or tumor induction.

Dissolved oxygen

DO is discussed in Section 2.5.1. Habitat and prey resources may be affected through temporary decreases in DO. Reductions in DO will likely be short lived if they occur at all. Fish exposure to decreased DO is not expected. Fish responses to prey reductions (prey reductions can be aggravated by low DO) are presented above in this section.

Entrainment

Entrainment is the process where objects are enclosed and transported within some form of vessel or where solid particles are drawn-in and transported by the flow of a fluid. In this context, entrainment refers to the uptake of aquatic organisms by dredge equipment. Mechanical (clamshell) dredges entrain organisms that are captured within the clamshell bucket. The likelihood of entrainment increase with a fish's proximity to the dredge, and the frequency of interactions.

Mechanical (clamshell) dredges commonly 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 entrained in a clamshell bucket, an organism, such as a fish, 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 is very unlikely, and that likelihood would decrease after the first few bucket cycles because mobile organisms are most likely to move away from the disturbance. Further, mechanical dredges move very slowly during dredging operations, with the barge 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. Most fish in the vicinity of the dredge at the start of the operation would likely swim away to avoid the noise and activity.

<u>Salmon</u>: Because salmon are easily able to avoid the clamshell bucket, potential entrainment risk to salmon are discountable.

<u>Green sturgeon</u>: Although highly mobile and known to make vertical migrations within the water column, sub-adult and adult green sturgeon exhibit behaviors that increase their risk of entrainment. They are benthic feeders that are most often found on or near the bottom while foraging or while moving within rivers and estuaries. They also tend to rest and feed in deep channels and pools during daylight hours. Nothing precludes green sturgeon from entering terminal areas during dredging, and while sturgeon density is likely to be low where the dredging work would occur, the risk of entrainment is discountable. As noted previously, the likelihood of entrainment is influenced by the size and swimming stamina of the exposed fish (Boysen and Hoover, 2009), with swimming stamina being positively correlated with the length of the fish. Juvenile sturgeon are relatively weak swimmers that are prone to bottom-holding behaviors that make them particularly vulnerable to entrainment (Hoover et al. 2011). Typically, sturgeon less than 8 inches (20 cm) in length are at the greatest risk of entrainment (Hoover et al. 2005; Boysen and Hoover 2009). If sturgeon are present, they are likely to be sub-adults or adults. We assumed for this analysis that sturgeon are present, but they are likely in the harbor in extremely low numbers only.

2.6 Cumulative Effects

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

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4). Because the Port and operations at Terminal 3 are expected to remain in operation for several decades, we do expect climate change conditions to become more pronounced over that time, which we anticipate may disrupt important habitat features and ecosystem functions that are critical in salmon survival and recovery.

NMFS does not expect any new non-Federal activities within the action area because the area is already highly developed with industrial activities. However, at the watershed scale, future upland development activities lacking a federal nexus will continue and are expected to lead to increased impervious surface, surface runoff, and non-point discharges. NMFS expects these activities to continue in perpetuity. These activities will degrade water quality and exert a negative influence on ESA-listed species. Any future federal actions will be subject to section 7(a)(2) consultation under ESA.

2.7 Integration and Synthesis

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

The species considered in this opinion are listed as threatened with extinction because of declines in abundance, poor productivity, and reduced spatial structure and diminished diversity. Systemic anthropogenic detriments in fresh and marine habitats are limiting the productivity for Puget Sound Chinook salmon and Puget Sound steelhead and southern DPS green sturgeon. Hood Canal Summer-run chum, however, has seen notable improvements in freshwater habitat, and, with the contribution of conservation hatchery practices, has improving abundance, productivity, and spatial structure in freshwater areas.

The environmental baseline in the action area 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. 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, we add the temporary effects of the proposed action, 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.

Critical Habitat
The temporary effects on features of designated critical habitat for PS Chinook salmon and southern DPS green sturgeon will be water quality and benthic disturbance. We expect diminishment of water quality based on turbidity, though suspended sediments will remain high several hours after dredging ceases. Turbidity will diminish water quality for up to 30 days in one work window, and will affect only about area of 2 acres.

The effects on benthic communities is also temporary, but much more persistent. Recovery time for the affect area is expected to not last longer than three years, with noticeable areas of recovery starting on the outer edges of the dredged area, starting weeks to months after dredging is completed.

The beneficial effects of removing known contaminants will improve water quality and substrate condition of the habitat. These effects will be incremental but permanent improvements to habitat within the action area.

When added to the baseline, and considered together with the anticipated negative cumulative impact of numerous non-federal effects, the temporary effects of the proposed action are not likely to impair long term conservation values of critical habitat designated for PS Chinook salmon or southern DPS green sturgeon, as marine sources of prey are not considered limiting for listed species within the harbor. We have determined that the impairments will not reduce conservation values of the critical habitat to serve the recovery goals for the listed species.

Species
Because the work windows are timed when juvenile salmon migration is largely avoided, and based on general migratory behavior of the listed species, we expect that PS Chinook salmon will only minimally be exposed to turbidity in the work window. The numbers of adult and juvenile Hood Canal summer-run chum and adult PS steelhead exposed to turbid conditions during the work window will be low. It is likely that the most acute of the temporary effects - turbidity - will be diffuse enough that the Hood Canal summer-run chum and steelhead populations will not be discernibly affected in terms of survival/abundance. The most chronic of the temporary effects – reduced benthic prey for up to approximately 3 years – should not affect fitness growth or survival of enough fish to discernibly reduce abundance of any cohort of any population within those 3 years.

An additional risk to listed fishes during construction is entrainment during dredging. Entrainment is likely to result in mortality, and is most likely to occur among green sturgeon. Green sturgeon have the greatest increased risk of mortality when dredging activities are ongoing (four weeks) because they rest and forage near the bottom where the dredge equipment could encounter them, but we expect, based on information from other locations, that the number of sturgeon injured or killed in this manner will be very few.

Accordingly, NMFS expects the very small reduction in numbers of PS Chinook salmon, Hood Canal summer-run chum, PS steelhead, and green sturgeon by the temporary effects. These effects, even when considered with cumulative effects, are insufficient to alter the productivity, spatial structure, or genetic diversity of any of the species. Therefore, when considered with the environmental baseline in the action area and cumulative effects, the action, as proposed, does not increase risk to the affected populations to a level that would appreciably reduce the likelihood for survival and recovery of the PS Chinook salmon ESU, PS steelhead DPS, Hood Canal summer-run chum salmon ESU, or green sturgeon southern DPS.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of PS chinook, PS steelhead, Hood Canal summer-run chum, or southern green sturgeon, or destroy or adversely modify PS chinook and southern green sturgeon designated critical habitats.

2.9 Incidental Take Statement

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

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that listed species will co-occur with the effects of the proposed action and therefore incidental take is reasonably certain to occur, as follows:

Entrainment

Incidental take caused by the adverse effects of the proposed action will include injury or death of a small number of ESA-listed fish due to entrainment. Take by this mechanism may affect green sturgeon of the southern DPS.

Due to the overall nature of the proposed action, a definitive number of ESA-listed fish that will be killed, injured or otherwise adversely affected cannot be determined. Instead NMFS will use a habitat-based surrogate to account for the amount of take, which is called an "extent" of take. For this proposed action, the potential to entrain southern green sturgeon is directly related to the amount of time the dredge is operating. Since turbid water conditions and the potential to entrain ESA-listed fish are most directly measured by the amount of time the dredge is actively operating, the extent of take identified for the proposed action has been related to the amount of time dredging. In-water work may occur for 30 days within the 2019/2020 or 2020/2021 in-water work window, between the dates of July 16 and February 15. The number of weeks of dredging (four) is a threshold for reinitiating consultation. Exceeding this indicator for extent of take will trigger the reinitiation provisions of this opinion.

Harm from suspended sediments/contaminants

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.

For this consultation, the best available indicator for the extent of take from suspended contaminants are the temporal and extent within contaminant levels increase from project activities to levels that can injure or kill fish in the action area while in-water work is occurring from the proposed actions. In-water work may occur for 30 days within the 2019/2020 or 2020/2021 in-water work window, between the dates of July 16 and February 15. 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 300 feet from ongoing activities.

The maximum extent of take is defined by the compliance area for turbidity monitoring within the 300 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.

Harm from reduced prey availability

Habitat modified for up to 3 years by reduced prey abundance and complexity is likely to injure individuals of the listed fish species in each year by decreasing growth, fitness, and or survival. As above, the number of fish so harmed cannot be predicted due to variability in their abundance, presence, and behavioral patterns, and an extent of take is provided instead. For this source of harm, the best indicator for the extent of take is spatial extent of the modified harbor bed, the 2.5 acres in which dredging will occur and dredge material 'fall back'settles, where benthic prey communities will be disrupted.

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

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

1. Minimize incidental take during dredging.

2. Minimize and monitor incidental take caused by elevated turbidity and suspended sediments during construction.

3. Ensure completion of a 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 minimizing incidental take.

2.9.4 Terms and Conditions

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

1. The following terms and conditions implement reasonable and prudent measure 1:

    The COE shall require the applicant to ensure the proposed action is in accordance with permit conditions, which set timing restrictions for 30 days, consecutive or non-consecutive, during the July 16 to February 15 for in-water work (2019/2020 or 2020/2021). Work during the month of October, or December to February 15 would expose the fewest species and life stages.

2. The following terms and conditions implement reasonable and prudent measure 2:

    The COE shall require the applicant/contractor to monitor turbidity levels in action area during sediment-generating activities when contaminated materials are involved. Monitoring shall be performed at 300 feet from dredging operations. Project activities will be modified or reduced when turbidity conditions exceed water quality monitoring standards as described in the Water Quality Certification issued for this project.

3. The following terms and conditions implement reasonable and prudent measure 3:

   a. Reporting. The Corps and contractor must report all monitoring items, including turbidity observations, size of the dredged area, amount of sediment removed, and dates of initiation and completion of dredging to NMFS within 60 days of the close of any work window that had in-water work within it. The contractor must report any exceedance of take covered by this opinion to NMFS immediately. The report must include a discussion of implementation of the terms and conditions in T&C's 1 and 2, above.
   b. The contractor must submit monitoring reports to:
      National Marine Fisheries Service
      Oregon Washington Coastal Area Office
      Attn: WCRO-2018-00063
      510 Desmond Drive SE, Suite 103
      Lacey, Washington 98503

2.10 Conservation Recommendations

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

The COE should work with the NNMFs to identify more restrictive work windows for dredging activities to protect the biological integrity of jurisdictional waters and promote species conservation.

2.11 Reinitiation of Consultation

This concludes formal consultation for Port of Port Angeles Terminal 3 Maintenance Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required 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 agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12 "Not Likely to Adversely Affect" Determinations

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.

Humpback whales. Humpback whales are baleen whales, filtering their food through the baleen from the water. They feed on tiny crustaceans (mostly krill), plankton, and small fish and can consume up to 3,000 pounds (1,360 kg) of food per day. Humpback whales were listed as endangered under the Endangered Species Conservation Act in June 1970 (35 FR 18319), and remained on the list of threatened and endangered species after the passage of the ESA in 1973 (35 FR 8491). A recovery plan for humpbacks was issued in November 1991 (NMFS 1991). On September 8, 2016, NMFS published a final rule to divide the globally listed endangered humpback whale into 14 DPSs and place four DPSs (Western North Pacific, Arabian Sea, Cape Verde/Northwest Africa, and Central America) as endangered and one (the Mexico DPS) as threatened (81 FR 62259). Only Central America and Mexico DPSs occur within the waters of the Pacific Northwest.

Since 2000, humpback whales have been sighted with increasing frequency in the inside waters of Washington (Falcone et. al. 2005). In 2014 and 2015 sightings sharply increased to around 500 each year (Orca Network).

Humpback whales pass by the outlet of the Port of Port Angeles while transiting the Juan de Fuca. However, presence in the Port of Port Angeles is extremely rare. As such, Humpback whales are not expected to be near the area where dredging will occur, regardless of what timing within the work window the dredging takes place, and no reductions disruptions in Humpback whale forage or migration is expected. Therefore, because the likelihood of exposure is extremely low, effects on Humpback whale are considered discountable. Critical habitat is not designated for these two species.

Southern Resident Killer Whales.

The Southern Resident killer whale Distinct Population Segment (DPS), composed of J, K and L pods, was listed as endangered under the ESA on November 18, 2005 (70 FR 69903). A 5-year review under the ESA completed in 2016 concluded that Southern Residents should remain listed as endangered and includes recent information on the population, threats, and new research results and publications (NMFS 2016).

The limiting factors described in the final recovery plan included reduced prey availability and quality, high levels of contaminants from pollution, and disturbances from vessels and sound (NMFS 2008). This section summarizes the status of Southern Resident killer whales throughout their range. This section summarizes information taken largely from the recovery plan (NMFS

2008), recent 5-year review (NMFS 2016), as well as new data that became available more recently.

The SRKW killer whales spend considerable time in the Georgia Basin from late spring to early autumn, with concentrated activity in the inland waters of Washington State around the San Juan Islands, and then move south into Puget Sound in early autumn. While these are seasonal patterns, SRKW have the potential to occur throughout their range (from central California north to the Queen Charlotte Islands) at any time during the year.

Critical habitat for the SRKW includes approximately 2,560 square miles of Puget Sound, excluding areas with water less than 20 feet deep relative to extreme high water. The three specific areas designated as critical habitat are (1) the Summer Core Area in Haro Strait and waters around the San Juan Islands; (2) Puget Sound; and (3) the Strait of Juan de Fuca.
The Port of Port Angeles is within SRKW critical habitat. However, it is highly unlikely that SRKW will enter the action area and so will no individuals will encounter or experience the effects of the action. 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 present. Thus, 30 days of water quality will be insignificant to the conservation values of the critical habitat. And, as stated above in Section 2.5, the effects on PS Chinook, a prey species of SR killer whales, will be too few fish in each of the 3 years that they could be affected, so that prey quantity as a habitat feature is only insignificantly affected. Finally, the dredging will not affect migration.

Over the long term, removal of this sediment is expected to provide a net beneficial effect, by improving water quality for and their prey by decreasing contaminant concentrations in the water column. Removal of these chemicals from the environment is especially important for SRKW which, as long-lived apex predators, accumulate persistent toxins which are passed across trophic levels and concentrated at the top of the food chain.

Based on this analysis, NMFS concurs with COE that the proposed action is not likely to adversely affect the subject listed southern resident killer whales, or their designated critical habitat.

Eulachon. The Pacific eulachon southern DPS was listed as threatened under the ESA in March 2010 (NMFS 2010). This DPS includes all eulachon that range from northern California to southwest and southcentral Alaska and into the southeastern Bering Sea. The Strait of Juan de Fuca lies between two of the larger eulachon spawning rivers (the Columbia and Fraser rivers). Although Puget Sound and the Strait of Juan de Fuca lack a major eulachon run (Gustafson et al. 2010), there has been a gradual increase in returns to the Elwha River, which likely reflects changes in biological status as well as improved monitoring (Gustafson et al. 2016). Prior to dam removal, eulachon were rare in the Elwha River system for the past 60 years and only occasional spawning had been reported from February to May (Gustafson et al. 2010; Shaffer 2009)). In January 2015, seining surveys in the lower Elwha River estuary collected hundreds of egg-bearing and spent eulachon, indicating that local spawning was occurring (Coastal Watershed Institute 2015). Larvae and young juveniles become widely distributed in coastal waters once they enter the ocean. Larvae have been caught via incidental plankton net catch in the Strait of Juan de Fuca on the north side of Ediz Hook (Fisheries and Oceans Canada 2014).

Little is known about the present status, timing, and migration routes of Eulachon the spawn in the Elwha River but there is evidence that spawning is increasing with the removal of the Elwha dams. Because spawning typically occurs in February to May, outside the in-water work window for this project, large aggregations of Eulachon in the action area are exceptionally unlikely. Thus, the short-lived water quality degradations of the dredge project are considered discountable to Eulachon, as exposure of fish is not expected to occur. The project may affect, but is not likely to adversely affect eulachon. The action area is not within habitat designated as critical for eulachon.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the **[***Federal agency***]** and descriptions of EFH for Pacific Coast groundfish (Pacific Fishery Management Council [PFMC] 2005), coastal pelagic species (CPS) (PFMC 1998), and Pacific Coast salmon (PFMC 2014); 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

The entire action area fully overlaps with identified EFH for Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species. Designated EFH for groundfish and coastal pelagic species encompasses all waters along the coasts of Washington, Oregon, and California that are seaward from the mean high water line, including the upriver extent of saltwater intrusion in river mouths to the boundary of the U. S. economic zone, approximately 230 miles (370.4 km) offshore (PFMC 1998a,b). Designated EFH for salmonid species within marine water extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California, north of Point Conception to the Canadian border (PFMC 1999). Groundfish, coastal pelagic, and salmonid fish species that could have designated EFH in the action area are listed in Table 3.

Table 3. EFH species in action area

Groundfish			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
arrowtooth flounder	Atheresthes stomias	rosy rockfish	Sebastes rosaceus
big skate	Raja binoculata	rougheye rockfish	Sebastes aleutianus
black rockfish	Sebastes melanops	sablefish	Anoplopoma fimbria
bocaccio	Sebastes paucispinis	sand sole	Psettichthys melanostictus
brown rockfish	Sebastes auriculatus	sharpchin rockfish	Sebastes zacentrus
butter sole	Isopsetta isolepis	English sole	Parophrys vetulus
cabezon	Scorpaenichthys marmoratus	flathead sole	Hippoglossoides elassodon
California skate	Raja inornata	greenstriped rockfish	Sebastes elongatus
canary rockfish	Sebastes pinniger	hake	Merluccius productus
China rockfish	Sebastes nebulosus	kelp greenling	Hexagrammos decagrammus
copper rockfish	Sebastes caurinus	lingcod	Ophiodon elongatus
curlfin sole	Pleuronichthys decurrens	longnose skate	Raja rhina
darkblotch rockfish	Sebastes crameri	Pacific cod	Gadus macrocephalus
Dover sole	Microstomus pacificus	Pacific ocean perch	Sebastes alutus
Pacific sanddab	Ctlharichthys sordidus	shortspine thornyhe	Sebastolobus alascanus
petrale sole	E opsetta jordani	spiny dogfish	Squalus acanthias
quillback rockfish	Sebastes maliger	splitnose rockfish	Sebastes diploproa
ratfish	Hydrolagus colliei	starry flounder	Platichthys stellatus
redbanded rockfish	Sebastes babcocki	stripetail rockfish	Sebastes saxicola
redstripe rockfish	Sebastes proriger	tiger rockfish	Sebastes nigrocinctus
rex sole	Glyptocephalus zachirus	vermilion rockfish	Sebastes miniatus
rock sole	Lepidopsetta bilineata	yelloweye rockfish	Sebastes ruberrimus
rosethorn rockfish	Sebastes helvomaculatus	yellowtail rockfish	Sebastes llavidus
Coastal Pelagic			
Common Name	**Scientific Name**		
market squid	Latigo opalescens		
northern anchovy	Engraulis mordax		
jack mackerel	Trachurus symmetricus		
Pacific mackerel	Scomber japonicus		
Pacific sardine	Sardinops sagax		
Salmonid Species			
Common Name	**Scientific Name**		
Chinook salmon	Oncorhynchus tshawytscha		
coho salmon	Oncorhynchus kisutch		
pink salmon	Oncorhynchus gorbuscha		

3.2 Adverse Effects on Essential Fish Habitat

The proposed actions will cause negative impacts on the quality of habitat by increasing suspended sediment, benthic disturbance, and increased concentrations of waterborne contaminants. These effects will occur during the work window with negative impacts on water quality quickly fading after the 4-week project is complete, and benthic prey reductions will quickly begin to improve, but full recovery to baseline levels of abundance and prey species complexity may take up to 3 years across the full 16.8 acres affected area.. There will be improvement of habitat quality and ecological function over the long term with the removal of contaminated sediments.

Several effect minimization measures are being implemented:

- Use a clamshell dredge. A clamshell dredge is the best available technique to minimize sediment input into the water column, reducing the likelihood of significant increases in turbidity/suspended sediment (NMFS 2001).
- A Water Quality Monitoring Plan, Dredging Plan, Spill Prevention Countermeasure and Control Plan, and other relevant plans will be prepared, approved by the agencies with jurisdiction, and implemented by the Contractor during construction.
- Turbidity will be monitored to ensure construction activities are in compliance with Washington State Surface Water Quality Standards (WAC 173-201A), and all conditions specified in a project-specific Water Quality Certification, if determined to be required and issued by the Washington State Department of Ecology.
- During dredging, dredge material will be placed on a barge or scow and will be passively dewatered, with water draining back to Port Angeles Harbor after sediment is allowed to settle and is passed through filter fabric or hay bales.
- A suite of 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
    - No riverbed leveling
    - 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 help filter suspended sediment from the return water.
- Dredge vessel personnel will be trained in hazardous material handling and spill response, and will be equipped with appropriate response tools, including absorbent oil booms. If a spill occurs, spill cleanup and containment efforts will begin immediately and will take precedence over normal work, and appropriate spill notifications will occur, per the conditions of the project permits and contract.
- The Contractor will inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks to prevent spills into the surface water.
- Dredged materials will be disposed of in an approved upland site.

Implementation of these minimization measures would avoid or minimize potential adverse effects of the proposed action.

3.3 Essential Fish Habitat Conservation Recommendations

Because the action itself will improve quality of habitat and ecosystem function, and includes BMPs sufficient to minimize impact to EFH, no additional conservation recommendations are being made at this time.

3.4 Statutory Response Requirement

Because NMFS is not making any conservation recommendations at this time, a 30 day response to conservation recommendations is not required.

3.5 Supplemental Consultation

The COE 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 is the COE and the Port of Port Angeles. Individual copies of this opinion were provided to the COE. 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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