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

Refer to NMFS No.:
WCRO-2022-01040

January 23, 2023

Captain John D. Berry
Commanding Officer
United States Coast Guard Facilities Design and Construction Center
Seattle Detachment
915 2nd Avenue, Room 2664
Seattle, Washington 98174

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Coast Guard FRC Homeport-Astoria East Tongue Point Project HUC 170800060202

Dear Captain Berry:

This letter responds to your April 27, 2022, request for initiation of consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and analysis because it met our screening criteria and contained all required information on, and analysis of, your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed United States Coast Guard (USCG) consultation request and related initiation package. Where relevant, we have adopted the information and analyses you have provided and/or referenced but only after our independent, science-based evaluation confirmed they meet our regulatory and scientific standards. We adopt by reference here:

- Section 2.2 (Project Elements) on BA pages 4-10 and Section 3.0 (Conservation Measures) on pages 10-13 for the description of the Proposed Action and Project Design Criteria (PDC)
- Section 4.0 (Action Area) on pages 13-16 for the Action Area
- Section 5.0 (Listed Species and Critical Habitat in the Action Area) on pages 16-28 and pages 30-34 for the Status of Species and Critical Habitat.
- Section 6.0 (Environmental Baseline Conditions) on pages 34-42 for the Environmental Baseline
- Section 7.0 (Analysis of Potential Effects to Species and Critical Habitat) on pages 42-55 for the Effects
- Section 8.1.6 on page 58, section 1.1.7 on pages 58 and 59 and section 8.2 on page 59 for Not Likely to Adversely Affect Determinations for humpback whales and Southern Resident Killer Whales (SRKW).
- Pages 1 and 2 of Appendix A, EFH Assessment, for the Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

Proposed Action. The proposed action includes dredging. Prior to the start of consultation, the USCG followed the Portland Sediment Evaluation Team (PSET) Sediment Evaluation Framework (SEF) to characterize the contaminants in the dredge sediment (prism) and leave surface (z-layer)[1]. The dredge area has active sediment deposition but was a U.S. Navy seaplane base and shipyard during and following World War II. The USCG divided the approximately 16-foot thick dredge prism into 2x2 approximately 8-foot thick dredge material management units (DMMU) to sort sediment vertically according to the complex industrial history of the site. The PSET determined that the top layer of dredge sediment (DMMU 1 and 3) around Pier 6 is suitable for Columbia River flow lane disposal and that the deeper layers of sediment in DMMU 2 and DMMU 4 are unsuitable for Columbia River flow lane disposal but are suitable for open ocean disposal. This sediment disposal strategy led to the relatively complex action area and in water work windows of the proposed action. The USCG provided NMFS with a Biological Assessment (BA) and a formal consultation request on April 27, 2022 and we initiated consultation on April 27, 2022.

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

The proposed action is described in BA Section 2.2 on page 4-10 and summarized below. The project will be done in three phases summarized below for the reader's convenience.

<u>Phase 1 March 1-September 30, 2023</u>

1. Remove the existing Pier 6 to make way for the new pier, ramp and floats. Pier 6 is 45,000 square foot supported by 396 piles.
    a. The contractor will remove the Pier 6 superstructure using a water debris boom and turbidity curtain to contain debris and sediment. If unidentified or hazardous materials are discovered after demolition begins, the contractor will immediately notify the USCG contracting officer prior to any further demolition.
    b. The contractor will remove creosote or salt treated piles with a vibratory pile driver from a spud barge and stage them on a demolition debris barge for upland disposal.
2. Dredge 124 220 cubic yards of sediment around Pier 6 and place 1-foot deep sand cover over the new z-layer.
    a. The contractor will select a dredge method (hydraulic or clamshell) to remove the top 56,000 cubic yards of shallow dredge units (DMMU 1 and DMMU 3). These DMMUs will be transported to a deepened area of the Columbia River about 1

[1] See BA Appendix D, PSET Final Sediment Suitability Determination Memorandum

mile from Pier 6 and just north of the Tongue point peninsula for flow lane disposal.

b. The contractor will use a close-lipped clamshell (environmental) mechanical dredge to remove 68,000 cubic yards of deep dredge units (DMMU 2 and DMMU 4)[2]. These DMMUs will be transported to the mouth of the Columbia River (MCR) ocean dredge material disposal site (ODMDS) between June 1 and August 31, 2023.

3. Reconstruct the existing rock revetment along the shoreline.
   a. The contractor will repair erosion damage to the existing riprap revetment. The contractor will (likely) use a tracked hydraulic excavator with rock and muck buckets from upland locations along the shoreline to remove and salvage to the extent practicable the existing riprap. The contractor will install a free-draining retention system or geotextile under open-graded crushed rock. The contractor will reinstall the salvaged riprap and new riprap over the crushed rock and fill existing voids at the walls.
   b. The contractor will install geocells filled with topsoil and native vegetation at the top of the revetment. It's anticipated this work would occur using a tracked-hydraulic excavator with rock and muck buckets from upland locations along the shoreline.

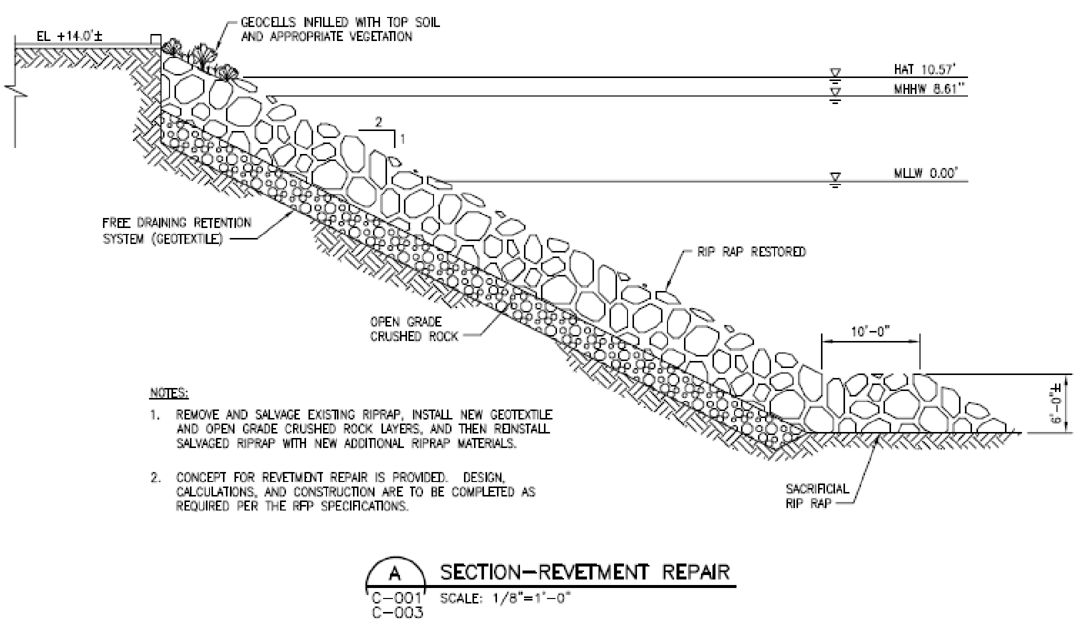

Figure 1. Riprap repair cross section

[2] The deeper DMMUs were found unsuitable for riverine placement but suitable for ocean disposal (PSET 2022).

Phase 2 October 1, 2023 to Feb 29, 2024

1. Construct a 250 foot by 40-foot pier, 2 ramps and 4 200-foot long by 15-foot wide floats (PRF).
    a. To construct the new PRF the contractor will drive 152 piles with an impact pile driver from with a crane on a water-based spud barge with piles stored on a separate material support barge. The contractor will drive 3 piles per 8-hour workday at up to 30 minutes per pile over 52 workdays. The data for sound pressure analysis is shown in Table 1.

Table 1. Impact pile driving strikes and duration.

Pile diameter and thickness	Supporting/ guiding	Total number	Driver/Hammer	Strikes/pile	Minutes/pile	Strikes/minute
30 x .75	Pier	122	D80-12	401	9	45
			D46	975	24	40
24 x .5	Floats	20	D46	975	24	40
18 x .5	Gangway platforms	8	D46	975	24	40
36 x .5	Donut Fenders	2	D80-12	401	9	45

    b. The contractor will install 250-foot long by 40-foot wide, pretensioned precast concrete panel pier with a cast in place concrete topping slab on bents spaced at 20 feet and precast concrete caps on 52 of the 30-inch diameter piles.
    c. The contractor will install 4 200-foot by 15-foot post tensioned concrete floating dock structures. Each float is secured to 10 24-inch diameter steel pipe guide piles and one 36-inch diameter steel pipe pile at the outboard corner of each float.
    d. The contractor will install 2 10-foot by 18-foot open gated steel gangway structures each supported by 4 18-inch diameter
    e. The contractor will install 2 65-foot long by 6-foot wide aluminum gangways to floating docks.

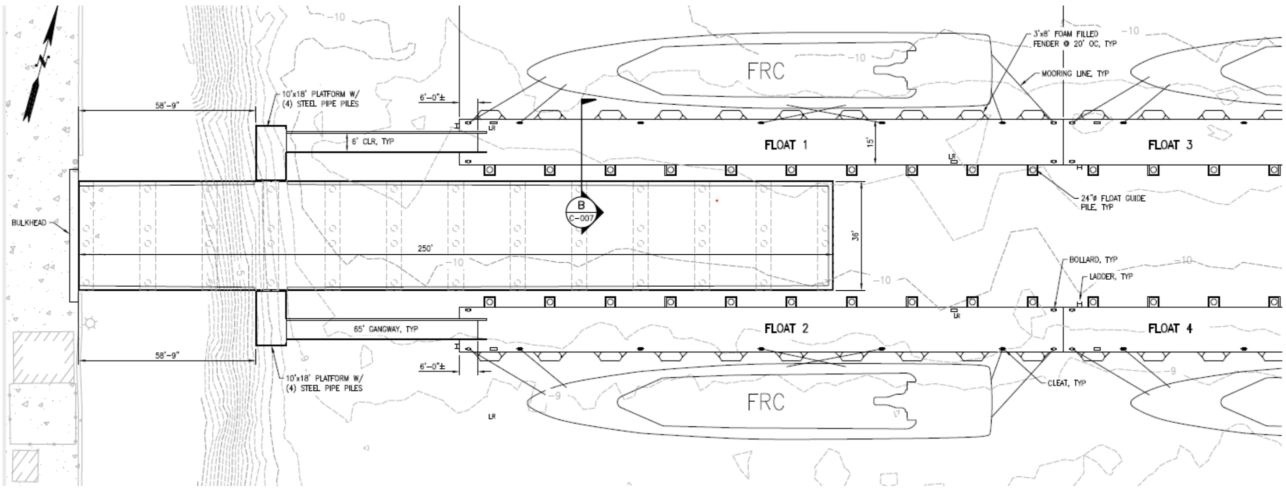

Figure 2. Overwater structure area

Phase 3 March 1, 2024 to September 30, 2025

1. Upland construction. The contractor will:
    a. Demolish several small buildings along the waterfront near Pier Six
    b. Remove hardscape surface along the waterfront from Pier 6 to the northeast corner and southeast end of the property
    c. Remove a derelict wooden wharf along the south end of the property
    d. Improve soil conditions to prevent liquefaction during an earthquake.
    e. Construct temporary buildings.
    f. Upgrade power, communications, potable water, sanitary sewer infrastructure.
    g. Construct up to 2,000 square feet of new hardscape for 88 parking stalls, 4 boat trailer stalls and 5 ADA parking stalls.
    h. Upgrade stormwater collection and conveyance infrastructure with new catch basins, new conveyance piping along the eastern side of the property, a water quality catch basin and water quality vault. Existing outfalls will not be upgraded.

The proposed action includes project design criteria (PDC) (called conservation measures in the BA) to minimize the effect of the proposed action on aquatic species and their habitat. PDCs are listed in BA Section 3 on pages 10-13.

Status of species and critical habitat. We examined the status of each species that would be adversely affected by the proposed action to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. We also examined the condition of critical habitat throughout the designated area and discuss the function of the physical or biological features essential to the conservation of the species that create the conservation value of that habitat. BA section 5.2.2 Table 5-2 lists the 15 NMFS managed ESA listed species[3] that

[3] Humpback whales and SRKW are covered in the not likely to adversely affect section of the BA and this biological opinion.

at times of the year occupy the action area and references for Federal Register notice of the species listing and critical habitat designation.

BA Table 5.3 summarizes the lower Columbia River (LCR) adult and juvenile migration times for each species. Section 5.3.3.2 on page 23-24 states that juvenile steelhead spend little time in the estuary, travel in deeper channels and avoid shallow and intertidal areas. BA Section 5.3.4.2 on page 25 states that juvenile Chinook salmon arrive in the estuary as early as February and some rear in the estuary until summer, rearing in shallow and intertidal areas. BA Section 5.3.5.2 on page 26 states that LCR coho salmon can rear in the estuary for up to two months in the spring, using both deep channels and shallow and intertidal areas. BA Section 5.3.6.2 states that CR chum salmon rear in the estuary shallow and intertidal areas for about a month as they migrate to the ocean in the spring. BA Section 5.3.7.2 states that SR sockeye salmon migrate through the estuary quickly in deep channels in May and June. BA Section 5.3.3 states that adult eulachon migrate quickly through the estuary in the mid to lower portions of the water column between January and April. BA Section 5.6.3 states that Southern DPS green sturgeon are in the estuary from July to December with subadults more likely to use shallow areas to forage.

We supplement the status of species and critical habitat information in the BA with the following two tables to summarize the abundance, productivity, spatial structure and diversity and the limiting factors to recovery for each species.

Table 2. Status of ESA listed species likely to be present in the action area.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Lower Columbia River Chinook salmon	Threatened 6/28/05	NMFS 2013	NMFS 2016; Ford 2022	This ESU comprises 32 independent populations. Relative to baseline VSP levels identified in the recovery plan (Dornbusch 2013), there has been an overall improvement in the status of a number of fall-run populations although most are still far from the recovery plan goals; Spring-run Chinook salmon populations in this ESU are generally unchanged; most of the populations are at a "high" or "very high" risk due to low abundances and the high proportion of hatchery-origin fish spawning naturally. Many of the populations in this ESU remain at "high risk," with low natural-origin abundance levels. Overall, we conclude that the viability of the Lower Columbia River Chinook salmon ESU has increased somewhat since 2016, although the ESU remains at "moderate" risk of extinction	• Reduced access to spawning and rearing habitat • Hatchery-related effects • Harvest-related effects on fall Chinook salmon • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Contaminant
Upper Columbia River spring-run Chinook salmon	Endangered 6/28/05	Upper Columbia Salmon Recovery Board 2007	NMFS 2016; Ford 2022	This ESU comprises four independent populations. Current estimates of natural-origin spawner abundance decreased substantially relative to the levels observed in the prior review for all three extant populations. Productivities also continued to be very low, and both abundance and productivity remained well below the viable thresholds called for in the Upper Columbia Salmon Recovery Plan for all three populations. Based on the information available for this review, the Upper Columbia River spring-run Chinook salmon ESU remains at high risk, with viability largely unchanged since 2016.	• Effects related to hydropower system in the mainstem Columbia River • Degraded freshwater habitat • Degraded estuarine and nearshore marine habitat • Hatchery-related effects • Persistence of non-native (exotic) fish species • Harvest in Columbia River fisheries

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Snake River spring/summer-run Chinook salmon	Threatened 6/28/05	NMFS 2017a	NMFS 2016; Ford 2022	This ESU comprises 28 extant and four extirpated populations. There have been improvements in abundance/productivity in several populations relative to the time of listing, but the majority of populations experienced sharp declines in abundance in the recent five-year period Overall, at this time we conclude that the Snake River spring/ summer-run Chinook salmon ESU continues to be at moderate-to-high risk.	• Degraded freshwater habitat • Effects related to the hydropower system in the mainstem Columbia River, • Altered flows and degraded water quality • Harvest-related effects • Predation
Upper Willamette River Chinook salmon	Threatened 6/28/05	NMFS 2011	NMFS 2016; Ford 2022	This ESU comprises seven populations. Abundance levels for all but Clackamas River DIP remain well below their recovery goals. Overall, there has likely been a declining trend in the viability of the Upper Willamette River Chinook salmon ESU since the last review. The magnitude of this change is not sufficient to suggest a change in risk category, however, so the Upper Willamette River Chinook salmon ESU remains at “moderate” risk of extinction.	• Degraded freshwater habitat • Degraded water quality • Increased disease incidence • Altered stream flows • Reduced access to spawning and rearing habitats • Altered food web due to reduced inputs of microdetritus • Predation by native and non-native species, including hatchery fish • Competition related to introduced salmon and steelhead • Altered population traits due to fisheries and bycatch
Snake River fall-run Chinook salmon	Threatened 6/28/05	NMFS 2017b	NMFS 2016; Ford 2022	This ESU has one extant population The single extant population in the ESU is currently meeting the criteria for a rating of “viable” developed by the ICTRT, but the ESU as a whole is not meeting the recovery goals described in the recovery plan for the species, which require the single population to be “highly viable with high certainty” and/or will require reintroduction of a viable population above the Hells Canyon Complex (NMFS 2017b). The Snake River fall-run Chinook salmon ESU therefore is considered to be at a moderate-to-low risk of extinction.	• Degraded floodplain connectivity and function • Harvest-related effects • Loss of access to historical habitat above Hells Canyon and other Snake River dams • Impacts from mainstem Columbia River and Snake River hydropower systems • Hatchery-related effects • Degraded estuarine and nearshore habitat.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Columbia River chum salmon	Threatened 6/28/05	NMFS 2013	NMFS 2016; Ford 2022	This species has 17 populations divided into 3 MPGs. 3 populations exceed the recovery goals established in the recovery plan (Dornbusch 2013). The remaining populations have unknown abundances. Abundances for these populations are assumed to be at or near zero. The viability of this ESU is relatively unchanged since the last review (moderate to high risk), and the improvements in some populations do not warrant a change in risk category, especially given the uncertainty regarding climatic effects in the near future.	• Degraded estuarine and nearshore marine habitat • Degraded freshwater habitat • Degraded stream flow as a result of hydropower and water supply operations • Reduced water quality • Current or potential predation • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants
Lower Columbia River coho salmon	Threatened 6/28/05	NMFS 2013	NMFS 2016; Ford 2022	Of the 24 populations that make up this ESUOnly six of the 23 populations for which we have data appear to be above their recovery goals. Overall abundance trends for the Lower Columbia River coho salmon ESU are generally negative. Natural spawner and total abundances have decreased in almost all DIPs, and Coastal and Gorge MPG populations are all at low levels, with significant numbers of hatchery-origin coho salmon on the spawning grounds. Improvements in spatial structure and diversity have been slight, and overshadowed by declines in abundance and productivity. For individual populations, the risk of extinction spans the full range, from "low" to "very high." Overall, the Lower Columbia River coho salmon ESU remains at "moderate" risk, and viability is largely unchanged since 2016.	• Degraded estuarine and near-shore marine habitat • Fish passage barriers • Degraded freshwater habitat: Hatchery-related effects • Harvest-related effects • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Snake River sockeye salmon	Endangered 6/28/05	NMFS 2015	NMFS 2016; Ford 2022	This single population ESU is at remains at "extremely high risk," although there has been substantial progress on the first phase of the proposed recovery approach—developing a hatchery-based program to amplify and conserve the stock to facilitate reintroductions. Current climate change modeling supports the "extremely high risk" rating with the potential for extirpation in the near future (Crozier et al. 2020). The viability of the Snake River sockeye salmon ESU therefore has likely declined since the time of the prior review, and the extinction risk category remains "high."	• Effects related to the hydropower system in the mainstem Columbia River • Reduced water quality and elevated temperatures in the Salmon River • Water quantity • Predation
Upper Columbia River steelhead	Threatened 1/5/06	Upper Columbia Salmon Recovery Board 2007	NMFS 2016; Ford 2022	This DPS comprises four independent populations. The most recent estimates (five year geometric mean) of total and natural-origin spawner abundance have declined since the last report, largely erasing gains observed over the past two decades for all four populations (Figure 12, Table 6). Recent declines are persistent and large enough to result in small, but negative 15-year trends in abundance for all four populations. The overall Upper Columbia River steelhead DPS viability remains largely unchanged from the prior review, and the DPS is at high risk driven by low abundance and productivity relative to viability objectives and diversity concerns.	• Adverse effects related to the mainstem Columbia River hydropower system • Impaired tributary fish passage • Degraded floodplain connectivity and function, channel structure and complexity, riparian areas, large woody debris recruitment, stream flow, and water quality • Hatchery-related effects • Predation and competition • Harvest-related effects

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Lower Columbia River steelhead	Threatened 1/5/06	NMFS 2013	NMFS 2016; Ford 2022	This DPS comprises 23 historical populations, 17 winter-run populations and 6 summer-run populations. 10 are nominally at or above the goals set in the recovery plan (Dornbusch 2013); however, it should be noted that many of these abundance estimates do not distinguish between natural- and hatchery- origin spawners. The majority of winter-run steelhead DIPs in this DPS continue to persist at low abundance levels (hundreds of fish), with the exception of the Clackamas and Sandy River DIPs, which have abundances in the low 1,000s. Although the five-year geometric abundance means are near recovery plan goals for many populations, the recent trends are negative. Overall, the Lower Columbia River steelhead DPS is therefore considered to be at "moderate" risk.	• Degraded estuarine and nearshore marine habitat • Degraded freshwater habitat • Reduced access to spawning and rearing habitat • Avian and marine mammal predation • Hatchery-related effects • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants
Upper Willamette River steelhead	Threatened 1/5/06	NMFS 2011	NMFS 2016; Ford 2022	This DPS has four demographically independent populations. Populations in this DPS have experienced long-term declines in spawner abundance. Although the recent magnitude of these declines is relatively moderate, continued declines would be a cause for concern. In the absence of substantial changes in accessibility to high-quality habitat, the DPS will remain at "moderate-to-high" risk. Overall, the Upper Willamette River steelhead DPS is therefore at "moderate-to-high" risk, with a declining viability trend.	• Degraded freshwater habitat • Degraded water quality • Increased disease incidence • Altered stream flows • Reduced access to spawning and rearing habitats due to impaired passage at dams • Altered food web due to changes in inputs of microdetritus • Predation by native and non-native species, including hatchery fish and pinnipeds • Competition related to introduced salmon and steelhead • Altered population traits due to interbreeding with hatchery origin fish

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Middle Columbia River steelhead	Threatened 1/5/06	NMFS 2009b	NMFS 2016; Ford 2022	This DPS comprises 17 extant populations. Recent (five-year) returns are declining across all populations, the declines are from relatively high returns in the previous five-to ten-year interval, so the longer-term risk metrics that are meant to buffer against short-period changes in abundance and productivity remain unchanged. The Middle Columbia River steelhead DPS does not currently meet the viability criteria described in the Middle Columbia River steelhead recovery plan.	• Degraded freshwater habitat • Mainstem Columbia River hydropower-related impacts • Degraded estuarine and nearshore marine habitat • Hatchery-related effects • Harvest-related effects • Effects of predation, competition, and disease
Snake River basin steelhead	Threatened 1/5/06	NMFS 2017a	NMFS 2016; Ford 2022	This DPS comprises 24 populations. Based on the updated viability information available for this review, all five MPGs are not meeting the specific objectives in the draft recovery plan, and the viability of many individual populations remains uncertain. Of particular note, the updated, population-level abundance estimates have made very clear the recent (last five years) sharp declines that are extremely worrisome, were they to continue.	• Adverse effects related to the mainstem Columbia River hydropower system • Impaired tributary fish passage • Degraded freshwater habitat • Increased water temperature • Harvest-related effects, particularly for B-run steelhead • Predation • Genetic diversity effects from out-of-population hatchery releases
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

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Southern DPS of eulachon	Threatened 3/18/10	NMFS 2017c	Gustafson et al. 2016	The Southern DPS of eulachon includes all naturally-spawned populations that occur in rivers south of the Nass River in British Columbia to the Mad River in California. Sub populations for this species include the Fraser River, Columbia River, British Columbia and the Klamath River. In the early 1990s, there was an abrupt decline in the abundance of eulachon returning to the Columbia River. Despite a brief period of improved returns in 2001-2003, the returns and associated commercial landings eventually declined to the low levels observed in the mid-1990s. Although eulachon abundance in monitored rivers has generally improved, especially in the 2013-2015 return years, recent poor ocean conditions and the likelihood that these conditions will persist into the near future suggest that population declines may be widespread in the upcoming return years	• Changes in ocean conditions due to climate change, particularly in the southern portion of the species' range where ocean warming trends may be the most pronounced and may alter prey, spawning, and rearing success. • Climate-induced change to freshwater habitats • Bycatch of eulachon in commercial fisheries • Adverse effects related to dams and water diversions • Water quality, • Shoreline construction • Over harvest • Predation

Table 3. Status of the critical habitat of species likely to present in the action area

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Lower Columbia River Chinook salmon	9/02/05 70 FR 52630	Critical habitat encompasses 10 subbasins in Oregon and Washington containing 47 occupied watersheds, as well as the lower Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some, or high potential for improvement. We rated conservation value of HUC5 watersheds as high for 30 watersheds, medium for 13 watersheds, and low for four watersheds.
Upper Columbia River spring-run Chinook salmon	9/02/05 70 FR 52630	Critical habitat encompasses four subbasins in Washington containing 15 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some, or high, potential for improvement. We rated conservation value of HUC5 watersheds as high for 10 watersheds, and medium for five watersheds. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Snake River spring/summer-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers (except the Clearwater River) presently or historically accessible to this ESU (except reaches above impassable natural falls and Hells Canyon Dam). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Upper Willamette River Chinook salmon	9/02/05 70 FR 52630	Critical habitat encompasses 10 subbasins in Oregon containing 56 occupied watersheds, as well as the lower Willamette/Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some, or high, potential for improvement. Watersheds are in good to excellent condition with no potential for improvement only in the upper McKenzie River and its tributaries (NMFS 2005). We rated conservation value of HUC5 watersheds as high for 22 watersheds, medium for 16 watersheds, and low for 18 watersheds.
Snake River fall-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers presently or historically accessible to this ESU (except reaches above impassable natural falls, and Dworshak and Hells Canyon dams). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Columbia River chum salmon	9/02/05 70 FR 52630	Critical habitat encompasses six subbasins in Oregon and Washington containing 19 occupied watersheds, as well as the lower Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 16 watersheds, and medium for three watersheds.
Lower Columbia River coho salmon	2/24/16 81 FR 9252	Critical habitat encompasses 10 subbasins in Oregon and Washington containing 55 occupied watersheds, as well as the lower Columbia River and estuary rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 34 watersheds, medium for 18 watersheds, and low for three watersheds.
Snake River sockeye salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers; Alturas Lake Creek; Valley Creek; and Stanley, Redfish, Yellow Belly, Pettit and Alturas lakes (including their inlet and outlet creeks). Water quality in all five lakes generally is adequate for juvenile sockeye salmon, although zooplankton numbers vary considerably. Some reaches of the Salmon River and tributaries exhibit temporary elevated water temperatures and sediment loads that could restrict sockeye salmon production and survival (NMFS 2015b). Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Upper Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 10 subbasins in Washington containing 31 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 20 watersheds, medium for eight watersheds, and low for three watersheds.
Lower Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses nine subbasins in Oregon and Washington containing 41 occupied watersheds, as well as the lower Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 28 watersheds, medium for 11 watersheds, and low for two watersheds.
Upper Willamette River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses seven subbasins in Oregon containing 34 occupied watersheds, as well as the lower Willamette/Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. Watersheds are in good to excellent condition with no potential for improvement only in the upper McKenzie River and its tributaries (NMFS 2005). We rated conservation value of HUC5 watersheds as high for 25 watersheds, medium for 6 watersheds, and low for 3 watersheds.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Middle Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 15 subbasins in Oregon and Washington containing 111 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of occupied HUC5 watersheds as high for 80 watersheds, medium for 24 watersheds, and low for 9 watersheds.
Snake River basin steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 25 subbasins in Oregon, Washington, and Idaho. Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
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. Several activities threaten the PBFs in coastal bays and estuaries and need special management considerations or protection. The application of pesticides, activities that disturb bottom substrates/ adversely affect prey resources/ degrade water quality through re-suspension of contaminated sediments, commercial shipping and activities 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/prey resources for green sturgeon.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Southern DPS of eulachon	10/20/11 76 FR 65324	Critical habitat for eulachon includes portions of 16 rivers and streams in California, Oregon, and Washington. All of these areas are designated as migration and spawning habitat for this species. In Oregon, we designated 24.2 miles of the lower Umpqua River, 12.4 miles of the lower Sandy River, and 0.2 miles of Tenmile Creek. We also designated the mainstem Columbia River from the mouth to the base of Bonneville Dam, a distance of 143.2 miles. Dams and water diversions are moderate threats to eulachon in the Columbia and Klamath rivers where hydropower generation and flood control are major activities. Degraded water quality is common in some areas occupied by southern DPS eulachon. In the Columbia and Klamath river basins, large-scale impoundment of water has increased winter water temperatures, potentially altering the water temperature during eulachon spawning periods. Numerous chemical contaminants are also present in spawning rivers, but the exact effect these compounds have on spawning and egg development is unknown. Dredging is a low to moderate threat to eulachon in the Columbia River. Dredging during eulachon spawning would be particularly detrimental.

We also supplement the status of the species information in the BA with the following summary of the effects of climate change on ESA listed species and critical habitat.

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. Major ecological realignments are already occurring in response to climate change (IPCC, 2022)). Long-term trends in warming have continued at global, national and regional scales. Global surface temperatures in the last decade (2010s) were estimated to be 1.09 °C higher than the 1850-1900 baseline period, with larger increases over land ~1.6 °C compared to oceans ~0.88 (IPCC WGI, 2021). The vast majority of this warming has been attributed to anthropogenic releases of greenhouse gases (IPCC WGI, 2021). Globally, 2014-2018 were the 5 warmest years on record both on land and in the ocean (2018 was the 4th warmest) (NOAA NCEI 2022). Events such as the 2013-2016 marine heatwave (Jacox et al. 2018) have been attributed directly to anthropogenic warming in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). Global warming and anthropogenic loss of biodiversity represent profound threats to ecosystem functionality (IPCC WGII 2022). These two factors are often examined in isolation, but likely have interacting effects on ecosystem function.

Updated projections of climate change are similar to or greater than previous projections (IPCC, 2021). NMFS is increasingly confident in our projections of changes to freshwater and marine systems because every year brings stronger validation of previous predictions in both physical and biological realms. Retaining and restoring habitat complexity, access to climate refuges (both flow and temperature) and improving growth opportunity in both freshwater and marine environments are strongly advocated in the recent literature (Siegel and Crozier 2020). Climate change is systemic, influencing freshwater, estuarine, and marine conditions. Other systems are also being influenced by changing climatic conditions. Literature reviews on the impacts of climate change on Pacific salmon (Crozier, 2011, 2012, 2013, 2014, 2015, 2016, 2017; Crozier and Siegel, 2018; Siegel and Crozier, 2019, 2020) have collected hundreds of papers documenting the major themes relevant for salmon. Here we describe habitat changes relevant to Pacific salmon and steelhead, prior to describing how these changes result in the varied specific mechanisms impacting these species in subsequent sections.

Forests

Climate change will impact forests of the western U.S., which dominate the landscape of many watersheds in the region. Forests are already showing evidence of increased drought severity, forest fire, and insect outbreak (Halofsky et al. 2020). Additionally, climate change will affect tree reproduction, growth, and phenology, which will lead to spatial shifts in vegetation. Halofsky et al. (2018) projected that the largest changes will occur at low- and high-elevation forests, with expansion of low-elevation dry forests and diminishing high-elevation cold forests and subalpine habitats.

Forest fires affect salmon streams by altering sediment load, channel structure, and stream temperature through the removal of canopy. Holden et al. (2018) examined environmental factors contributing to observed increases in the extent of forest fires throughout the western United States. They found strong correlations between the number of dry-season rainy days and the annual extent of forest fires, as well as a significant decline in the number of dry-season rainy days over the study period (1984-2015). Consequently, predicted decreases in dry-season precipitation, combined with increases in air temperature, will likely contribute to the existing trend toward more extensive and severe forest fires and the continued expansion of fires into higher elevation and wetter forests (Alizedeh 2021).

Agne et al. (2018) reviewed literature on insect outbreaks and other pathogens affecting coastal Douglas-fir forests in the Pacific Northwest and examined how future climate change may influence disturbance ecology. They suggest that Douglas-fir beetle and black stain root disease could become more prevalent with climate change, while other pathogens will be more affected by management practices. Agne et al. (2018) also suggested that due to complex interacting effects of disturbance and disease, climate impacts will differ by region and forest type.

Freshwater Environments

The following is excerpted from Siegel and Crozier (2019), who present a review of recent scientific literature evaluating effects of climate change, describing the projected impacts of climate change on instream flows:

Cooper et al. (2018) examined whether the magnitude of low river flows in the western U.S., which generally occur in September or October, are driven more by summer conditions or the prior winter’s precipitation. They found that while low flows were more sensitive to summer evaporative demand than to winter precipitation, interannual variability in winter precipitation was greater. Malek et al. (2018), predicted that summer evapotranspiration is likely to increase in conjunction with declines in snowpack and increased variability in winter precipitation. Their results suggest that low summer flows are likely to become lower, more variable, and less predictable.

The effect of climate change on ground water availability is likely to be uneven. Sridhar et al. (2018) coupled a surface-flow model with a ground-flow model to improve predictions of surface water availability with climate change in the Snake River Basin. Projections using RCP 4.5 and 8.5 emission scenarios suggested an increase in water table heights in downstream areas of the basin and a decrease in upstream areas.

As cited in Siegel and Crozier (2019), Isaak et al. (2018), examined recent trends in stream temperature across the Western U.S. using a large regional dataset. Stream warming trends paralleled changes in air temperature and were pervasive during the low-water warm seasons of 1996-2015 (0.18-0.35°C/decade) and 1976-2015 (0.14-0.27°C/decade). Their results show how continued warming will likely affect the cumulative temperature exposure of migrating sockeye salmon *O. nerka* and the availability of suitable habitat for brown trout *Salmo trutta* and rainbow trout *O. mykiss*. Isaak et al. (2018) concluded that most stream habitats will likely remain suitable for salmonids in the near future, with some becoming too warm. However, in cases where habitat access is currently restricted by dams and other barriers salmon and steelhead will be confined to downstream reaches typically most at risk of rising temperatures unless passage is restored (FitzGerald et al. 2020, Myers et al. 2018).

Streams with intact riparian corridors and that lie in mountainous terrain are likely to be more resilient to changes in air temperature. These areas may provide refuge from climate change for a number of species, including Pacific salmon. Krosby et al. (2018), identified potential stream refugia throughout the Pacific Northwest based on a suite of features thought to reflect the ability of streams to serve as such refuges. Analyzed features include large temperature gradients, high canopy cover, large relative stream width, low exposure to solar radiation, and low levels of human modification. They created an index of refuge potential for all streams in the region, with mountain area streams scoring highest. Flat lowland areas, which commonly contain migration corridors, were generally scored lowest, and thus were prioritized for conservation and restoration. However, forest fires can increase stream temperatures dramatically in short time-spans by removing riparian cover (Koontz et al. 2018), and streams that lose their snowpack with climate change may see the largest increases in stream temperature due to the removal of temperature buffering (Yan et al. 2021). These processes may threaten some habitats that are currently considered refugia.

Marine and Estuarine Environments

Along with warming stream temperatures and concerns about sufficient groundwater to recharge streams, a recent study projects nearly complete loss of existing tidal wetlands along the U.S. West Coast, due to sea level rise (Thorne et al. 2018). California and Oregon showed the greatest threat to tidal wetlands (100%), while 68% of Washington tidal wetlands are expected to be submerged. Coastal development and steep topography prevent horizontal migration of most wetlands, causing the net contraction of this crucial habitat.

Rising ocean temperatures, stratification, ocean acidity, hypoxia, algal toxins, and other oceanographic processes will alter the composition and abundance of a vast array of oceanic species. In particular, there will be dramatic changes in both predators and prey of Pacific salmon, salmon life history traits and relative abundance. Siegel and Crozier (2019) observe that changes in marine temperature are likely to have a number of physiological consequences on fishes themselves. For example, in a study of small planktivorous fish, Gliwicz et al. (2018) found that higher ambient temperatures increased the distance at which fish reacted to prey. Numerous fish species (including many tuna and sharks) demonstrate regional endothermy, which in many cases augments eyesight by warming the retinas. However, Gliwicz et al. (2018) suggest that ambient temperatures can have a similar effect on fish that do not demonstrate this trait. Climate change is likely to reduce the availability of biologically essential omega-3 fatty acids produced by phytoplankton in marine ecosystems. Loss of these lipids may induce cascading trophic effects, with distinct impacts on different species depending on compensatory mechanisms (Gourtay et al. 2018). Reproduction rates of many marine fish species are also likely to be altered with temperature (Veilleux et al. 2018). The ecological consequences of these effects and their interactions add complexity to predictions of climate change impacts in marine ecosystems.

Perhaps the most dramatic change in physical ocean conditions will occur through ocean acidification and deoxygenation. It is unclear how sensitive salmon and steelhead might be to the direct effects of ocean acidification because of their tolerance of a wide pH range in freshwater (although see Ou et al. 2015 and Williams et al. 2019), however, impacts of ocean acidification and hypoxia on sensitive species (e.g., plankton, crabs, rockfish, groundfish) will likely affect salmon indirectly through their interactions as predators and prey. Similarly, increasing frequency and duration of harmful algal blooms may affect salmon directly, depending on the toxin (e.g., saxitoxin vs domoic acid), but will also affect their predators (seabirds and mammals). The full effects of these ecosystem dynamics are not known but will be complex. Within the historical range of climate variability, less suitable conditions for salmonids (e.g., warmer temperatures, lower streamflows) have been associated with detectable declines in many of these listed units, highlighting how sensitive they are to climate drivers (Ford 2022, Lindley et al. 2009, Williams et al. 2016, Ward et al. 2015). In some cases, the combined and potentially additive effects of poorer climate conditions for fish and intense anthropogenic impacts caused the population declines that led to these population groups being listed under the ESA (Crozier et al. 2019).

Climate change effects on salmon and steelhead

In freshwater, year-round increases in stream temperature and changes in flow will affect physiological, behavioral, and demographic processes in salmon, and change the species with which they interact. For example, as stream temperatures increase, many native salmonids face increased competition with more warm-water tolerant invasive species. Changing freshwater temperatures are likely to affect incubation and emergence timing for eggs, and in locations where the greatest warming occurs may affect egg survival, although several factors impact intergravel temperature and oxygen (e.g., groundwater influence) as well as sensitivity of eggs to thermal stress (Crozier et al. 2020). Changes in temperature and flow regimes may alter the amount of habitat and food available for juvenile rearing, and this in turn could lead to a restriction in the distribution of juveniles, further decreasing productivity through density dependence. For migrating adults, predicted changes in freshwater flows and temperatures will likely increase exposure to stressful temperatures for many salmon and steelhead populations, and alter migration travel times and increase thermal stress accumulation for ESUs or DPSs with early-returning (i.e. spring- and summer-run) phenotypes associated with longer freshwater holding times (Crozier et al. 2020, FitzGerald et al. 2020). Rising river temperatures increase the energetic cost of migration and the risk of *en route* or pre-spawning mortality of adults with long freshwater migrations, although populations of some ESA-listed salmon and steelhead may be able to make use of cool-water refuges and run-timing plasticity to reduce thermal exposure (Keefer et al. 2018, Barnett et al. 2020).

Marine survival of salmonids is affected by a complex array of factors including prey abundance, predator interactions, the physical condition of salmon within the marine environment, and carryover effects from the freshwater experience (Burke et al., 2013; Holsman et al., 2012). It is generally accepted that salmon marine survival is size-dependent, and thus larger and faster growing fish are more likely to survive (Gosselin et al., 2021). Furthermore, early arrival timing in the marine environment is generally considered advantageous for populations migrating through the Columbia River. However, the optimal day of arrival varies across years, depending on the seasonal development of productivity in the California Current, which affects prey available to salmon and the risk of predation (Chasco et al., 2021). Siegel and Crozier (2019) point out the concern that for some salmon populations, climate change may drive mismatches between juvenile arrival timing and prey availability in the marine environment. However, phenological diversity can contribute to metapopulation-level resilience by reducing the risk of a complete mismatch. Carr-Harris et al. (2018), explored phenological diversity of marine migration timing in relation to zooplankton prey for sockeye salmon *O. nerka* from the Skeena River of Canada. They found that sockeye migrated over a period of more than 50 days, and populations from higher elevation and further inland streams arrived in the estuary later, with different populations encountering distinct prey fields. Carr-Harris et al. (2018) recommended that managers maintain and augment such life-history diversity.

Synchrony between terrestrial and marine environmental conditions (e.g., coastal upwelling, precipitation and river discharge) has increased in spatial scale causing the highest levels of synchrony in the last 250 years (Black et al. 2018). A more synchronized climate combined with simplified habitats and reduced genetic diversity may be leading to more synchrony in the productivity of populations across the range of salmon (Braun et al., 2016). For example, salmon productivity (recruits/spawner) has also become more synchronized across Chinook populations from Oregon to the Yukon (Dorner et al. 2018, Kilduff et al. 2014). In addition, Chinook salmon have become smaller and younger at maturation across their range (Ohlberger 2018). Other Pacific salmon species (Stachura el al. 2014) and Atlantic salmon (Olmos et al. 2020) also have demonstrated synchrony in productivity across a broad latitudinal range.

At the individual scale, climate impacts on salmon in one life stage generally affect body size or timing in the next life stage and negative impacts can accumulate across multiple life stages (Healey 2011; Wainwright and Weitkamp 2013, Gosselin et al. 2021). Changes in winter precipitation will likely affect incubation and/or rearing stages of most populations. Changes in the intensity of cool season precipitation, snow accumulation, and runoff could influence migration cues for fall, winter and spring adult migrants, such as coho and steelhead. Egg survival rates may suffer from more intense flooding that scours or buries redds. Changes in hydrological regime, such as a shift from mostly snow to more rain, could drive changes in life history, potentially threatening diversity within an ESU (Beechie et al. 2006). Changes in summer temperature and flow will affect both juvenile and adult stages in some populations, especially those with yearling life histories and summer migration patterns (Crozier and Zabel 2006; Crozier et al. 2010, Crozier et al. 2019).

At the population level, the ability of organisms to genetically adapt to climate change depends on how much genetic variation currently exists within salmon populations, as well as how selection on multiple traits interact, and whether those traits are linked genetically. While genetic diversity may help populations respond to climate change, the remaining genetic diversity of many populations is highly reduced compared to historic levels. For example, Johnson et al. (2018), compared genetic variation in Chinook salmon from the Columbia River Basin between contemporary and ancient samples. A total of 84 samples determined to be Chinook salmon were collected from vertebrae found in ancient middens and compared to 379 contemporary samples. Results suggest a decline in genetic diversity, as demonstrated by a loss of mitochondrial haplotypes as well as reductions in haplotype and nucleotide diversity. Genetic losses in this comparison appeared larger for Chinook from the mid-Columbia than those from the Snake River Basin. In addition to other stressors, modified habitats and flow regimes may create unnatural selection pressures that reduce the diversity of functional behaviors (Sturrock et al. 2020). Managing to conserve and augment existing genetic diversity may be increasingly important with more extreme environmental change (Anderson et al. 2015), though the low levels of remaining diversity present challenges to this effort (Freshwater 2019). Salmon historically maintained relatively consistent returns across variation in annual weather through the portfolio effect (Schindler et al., 2015), in which different populations are sensitive to different climate drivers. Applying this concept to climate change, Anderson et al (2015) emphasized the additional need for populations with different physiological tolerances. Loss of the portfolio increases volatility in fisheries, as well as ecological systems, as demonstrated for Fraser River and Sacramento River stock complexes (Freshwater et al., 2019; Munsch et al., 2022).

"**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). BA section 4.0 describes the action area which is defined by; the radial point where sound pressure waves from impact pile driving are blocked by land or decrease below 182 dB_{SEL}, the mixing zone around the dredge sediment flow lane disposal site adjacent to the federal navigation channel (FNC) north of Tongue Point, the FNC from Tongue Point to the mouth of the Columbia River, a route from the mouth of the Columbia River to the Mouth of the Columbia River Deep Water Site MCR DWS and the mixing zone around dredge material dumped at the MCR DWS. The action area is shown in BA Figure 4.1, page 16 reproduced below for the readers convenience.

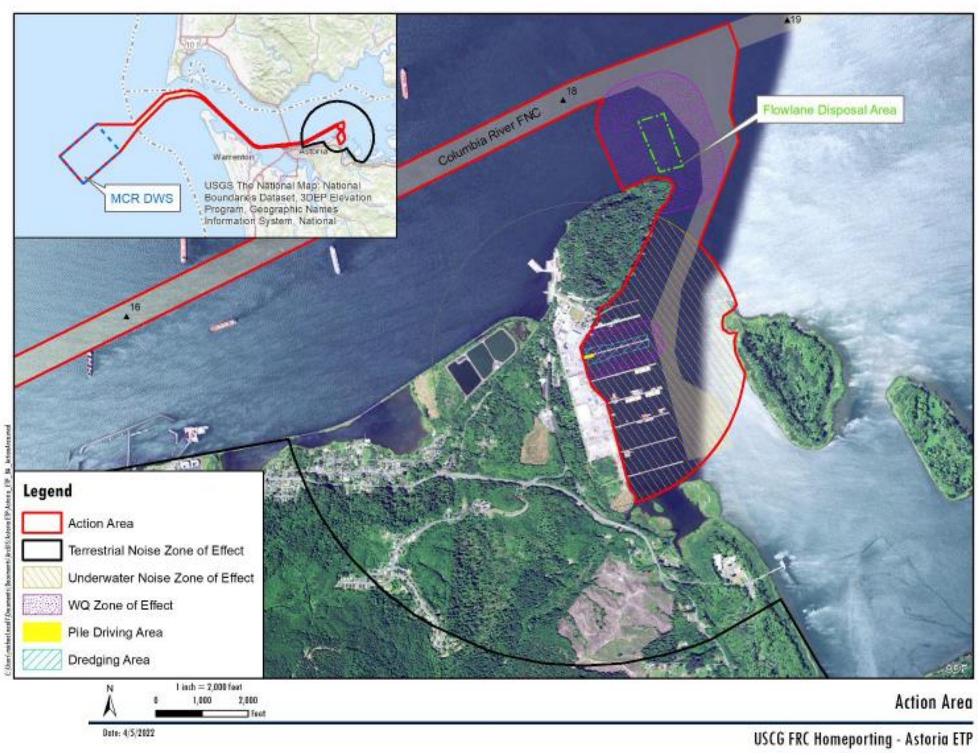

Figure 3. Action Area

Environmental Baseline. The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

BA section 6.0, Environmental Baseline Conditions, on pages 34-42 provides the description of the environmental baseline of the action area. In particular, Section 6.2.2 describes the source of contaminants in the water column noting that the LCR is Section 303(d) listed for arsenic, DDE 4,4, fecal coliform and temperature and that the leaking underground storage tanks and the weathering of former Tongue Point Naval Air Station structures contribute semi-volatile organic compounds, pesticides, arsenic and metals to the water column. Likewise, BA Section 6.3.1 describes the legacy Tongue Point Naval Air Station contaminants in sediment including Polycyclic Aromatic Hydrocarbons (PAH), DDT, Polychlorinated biphenyls (PCB), lead arsenic, mercury, pesticides, dioxins/furans, selenium and chromium and the process by which PSET and the USCG developed the proposed dredge sediment disposal strategy.

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

The biological assessment provides a detailed discussion and comprehensive assessment of the effects of the proposed action in Section 7.0 of the initiation package, and is adopted here (50 CFR 402.14(h)(3)). Identified adverse effects include noise during construction, suspended sediment introduced from upland work, temporary reductions of benthic conditions, water quality reductions from contaminants during in-water disposal, shade, and structure in aquatic habitat. NMFS has evaluated this section and after our independent, science-based evaluation determined it meets our regulatory and scientific standards.

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

The BA did not include a cumulative effects section but BA Section 2.1.1 East Tongue Point and Vicinity on page 2 described the facilities on the East Tongue Point site which include a U. S.

Department of Labor Job Corps Center and several industrial users. In addition to pier 6, the action area includes 5 long overwater structures remaining from World War II. Any future proposed action involving these structures would undergo Section 7 consultation. The Columbia River flow lane disposal site is adjacent to the Federal Navigation channel and any future actions involving this site or the navigation channel would undergo Section 7 consultation. The action area includes the MCR ODMDS managed by the EPA ocean disposal program. MCR ODMDS use for dredge sediment that originated from ESA listed species critical habitat would undergo Section 7 consultation. Non-federal activities that are likely to influence the action area are upland sources of water quality degradation associated with intensifying land uses, and effects on water temperature, salinity, and acidity associated with climate change.

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 to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

As shown in Table 2, ESA listed salmon and steelhead, eulachon and green sturgeon are at a low level of persistence and moderate risk of extinction. The BA Section 5.3 makes it clear that individuals from all Table 1species are likely to migrate into or near the action area at some point in their life history and some salmon species and green sturgeon likely rear and forage in the action area for weeks to months. BA Section 6 makes it clear that all fish in the action area will encounter habitat conditions that have been degraded by human activity. BA Section 7 shows that the proposed action will result in disturbances in the action area such that the fish that enter the action area during and after construction will likely be exposed to effects from noise, sediment and the OWS presence and may but are unlikely to be exposed to toxic contaminants from construction equipment leaks and stormwater at an intensity or duration that results in injury or death. Recovery of the action area from baseline conditions to properly functioning conditions is likely to be extremely slow because the action area is segregated from natural habitat recovery process so that it can provide multiple societal functions including the proposed FRC dock. Although dredging does remove sediment sequestered contaminants from past industrial activities in the action area, most baseline conditions will continue to limit fish rearing and migration in the action area and contribute a small negative pressure on population abundance trends into the future.

While the projects construction and permanent effects are adverse for the Table 2 threatened and endangered fish in the action area, their effect on the abundance of any specific population is expected to be much too low to alter the productivity, spatial structure or diversity of any of the component populations. Because the proposed action's small reduction in abundance will not appreciably reduce the productivity, spatial structure or diversity of the affected populations, the action, even when combined with a degraded environmental baseline will not appreciably reduce the likelihood of survival or recovery of any of the listed species considered in this opinion.

With regards to critical habitat, because the proposed action is OWS construction, riprap repair and dredging its effects to critical habitat are permanent. However, the FRC OWS replaces an old, much larger OWS constructed with creosote treated piles so removing the old OWS and sediment surrounding it improves critical habitat PBFs more than the presence of the new OWS and maintenance dredging diminishes them.

In summary, ESA-listed salmon and steelhead occupying the action area will be exposed to effects from the proposed action but NMFS analysis did not identify effects with intensities or durations that would result in the reduction of the value of the designated critical habitat for migration or rearing or reductions in productivity, diversity, or spatial structure of exposed populations, thus the survival and recovery of ESA listed species are also not reduced.

Conclusion. After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of LCR Chinook salmon, UCR spring-Chinook salmon, SR spring/summer Chinook salmon, UWR Chinook salmon, SR fall Chinook salmon, CR chum salmon, LCR coho salmon, SR sockeye salmon, UCR steelhead, LCR steelhead, UWR steelhead, MCR steelhead, SRB steelhead, Southern DPS green sturgeon, or Southern DPS eulachon or destroy or adversely modify their designated critical habitat.

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.

Amount or Extent of Take

A definitive number of ESA-listed fish that will be harmed, injured or killed cannot be estimated or measured because of the highly variable presence of species over time and the inability to observe injured or dead specimens. In such a case we provide an "extent of take" which identifies an observable measure causally tied to the type of take. In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Take in the form of harm, injury, or death from impact pile driving will take place when listed salmon, steelhead, eulachon and green sturgeon are in the action area. This will expose some of these fish to noise and peak or cumulative sound pressure waves that alters their behavior or injures or kills them.

For this proposed action, the extent of take from impact pile driving is 150,000 strikes to install 152 steel pipe piles.

The extent of take in the form of harm from modified benthic condition, and turbid conditions inclusive of some contaminated sediments is 300 feet downstream from the point of dredging, for up to 50 days of in-water dredging work, and 900 feet downstream from the point of discharge for flow lane disposal for up to 45 days of in-water disposal.

The extent or take in the form of harm from shade and in-water structure is the 250 foot long gangway.

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.

Reasonable and Prudent Measures

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

For the proposed action, BMPs (Conservation Measures on BA pages 10 to 13) minimize incidental take to the greatest degree practicable. Section 9 requires that each formal consultation include a RPM that the action agency provide NMFS with a report that shows that the incidental take surrogate was not exceeded. For this reason, the single RPM is that the USCG provide a post-project report.

Terms and Conditions

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

The single term and condition is: Provide a report within 90 days of the completion of pile driving that documents

- that the number of impact pile driving strikes did not exceed 150,000,
- that the as-built gangway does not exceed dimensions described in the proposed action

- that no exceedance of water quality standards for turbidity zones occurred.

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).

Construct stormwater treatment facilities sufficient to provide treatment of runoff from all existing, new and replaced PGIS in the project area.

Not Likely to Adversely Affect

The action area overlaps designated critical habitat for humpback whales and Southern Resident Killer Whales (SRKW).

BA Section 8.1.6 on page 58 analyzes the effects of the proposed action, particularly transport of dredge sediment to the MCR ODMDS on humpback whales and Section 8.2 on page 59 analyses the effects of the proposed action on humpback whale critical habitat. The USCG concludes, and we concur, that the proposed action is not likely to adversely affect humpback whales or their critical habitat.

BA Section 8.1.7 on pages 58 and 59 analyzes the effects of the proposed action, particularly transport of dredge sediment to the MCR ODMDS on SRKW and Section 8.8 on page 59 analyzes the effects of the proposed action on SRKW critical habitat. The USCG concludes, and we concur, that the proposed action is not likely to adversely affect SRKW or their critical habitat.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the USCG or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) the amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this biological opinion; or if (4) a new species is listed or critical habitat designated that may be affected by the identified action.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was conducted pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

The BA includes an EFH analysis in Appendix A pages 1 and 2. The BA concludes that the proposed action adversely affects Pacific Coast salmon, Pacific Coast groundfish and Coastal pelagic species EFH. We adopt by reference (and copy here) the list of adverse effects to EFH on Appendix A page 1.

1. Dredging in the vicinity of Pier 6 will alter (deepen) shallow water habitat.
2. Dredging may lead to the reduction and mortality of the benthic infaunal community (prey reduction).
3. Pile driving, pile extraction and dredging may temporarily increase aquatic noise levels above background noise levels.
4. Increased suspended sediment during pile driving, pile extraction and dredging may temporarily reduce water quality.

BA Section 3.0 Conservation Measures, describes BMPs to minimize the effect of proposed action stressors on ESA listed species and critical habitat. The BA notes that these conservation measures also minimize the adverse effects to EFH listed above. For this reason, no additional conservation recommendations are provided here.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The biological opinion will be available through the NOAA Institutional Repository at: https://appscloud.fisheries.noaa.gov/suite/sites/eco. A complete record of this consultation is on file at Lacey, Washington.

Please contact Tom Hausmann, in Portland, Oregon, at 503-231-2315 if you have any questions concerning this consultation, or if you require additional information

Sincerely,

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

cc: Mr. Raven Smith, USCG

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