



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No:
WCRO-2019-03305

January 23, 2020

William D. Abadie
Chief, Regulatory Branch
U.S. Army Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the McCall Oil Maintenance Dredging on the Willamette River (HUC 170900120202), Multnomah County, Oregon (Corps No.:NWP-1993-134-3).

Dear Mr. Abadie:

Thank you for your letter of October 22, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for McCall Oil Maintenance Dredging. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action.

In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, LCR coho salmon (*O. kisutch*), LCR steelhead (*O. mykiss*), or UWR steelhead, or result in the destruction or adverse modification of their designated critical habitats. As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal action agency must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

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This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are identical to the ESA take statement's terms and conditions. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH conservation recommendations, the Federal action agency must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations.

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

Please contact Kate Wells, in the Willamette Branch of the Oregon Washington Coastal Office, at 503-230-5437 or Kathleen.Wells@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,



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

cc: Melody White (Corps)
Edgar "Ted" McCall (McCall Oil)
Anchor QEA (Valarie Oster)

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

McCall Oil Maintenance Dredging on the Willamette River (HUC 170900120202)
Multnomah County, Oregon
(Corps No.:NWP-1993-134-3)

NMFS Consultation Number: WCRO-2019-03305

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?
Lower Columbia River Chinook Salmon (<i>Oncorhynchus tshawytscha</i>)	Threatened	Yes	No	Yes	No
Upper Willamette River Chinook Salmon (<i>O. tshawytscha</i>)	Threatened	Yes	No	Yes	No
Lower Columbia River Coho Salmon (<i>O. kisutch</i>)	Threatened	Yes	No	Yes	No
Lower Columbia River Steelhead (<i>O. mykiss</i>)	Threatened	Yes	No	Yes	No
Upper Willamette River Steelhead (<i>O. mykiss</i>)	Threatened	Yes	No	Yes	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 Salmon	Yes	Yes

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

Issued By:



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

Date: January 23, 2020

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1. INTRODUCTION

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

1.1 Background

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

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

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

1.2 Consultation History

The NMFS received a letter from the U.S. Army Corps of Engineers (Corps) on October 22, 2019, requesting initiation of formal ESA consultation on the effects of authorizing McCall Oil and Chemical Corporation (MOCC) to conduct maintenance dredging and cover layer placement, based on their authority under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act. The dredging and cover layer placement will take place at Willamette River mile 7.8 on the west bank of the Willamette River, in Multnomah County, Oregon. Along with the letter from the Corps, we received a biological assessment, and project maps and photographs. Consultation was initiated on October 30, 2019, after receiving clarifying information from the Corps on sediment testing procedures for cap material and the use of an environmental bucket for dredging. This document is based on the information provided in the documents described above.

The Corps determined that the proposed action is likely to adversely affect Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, LCR coho salmon (*O. kisutch*), LCR steelhead (*O. mykiss*), and UWR steelhead. The Corps also determined that designated critical habitat for the species listed above and EFH for Chinook and coho salmon may be adversely affected by the proposed action.

A complete record of this consultation is on file in Portland, Oregon.

1.3 Proposed Federal Action

“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). 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).] We considered whether or not the proposed action would cause any other activities and determined that it would not result in additional actions.

The proposed action includes maintenance dredging in the existing berth to re-establish adequate depths at MOCC’s only pier location, illustrated in Figure 1.

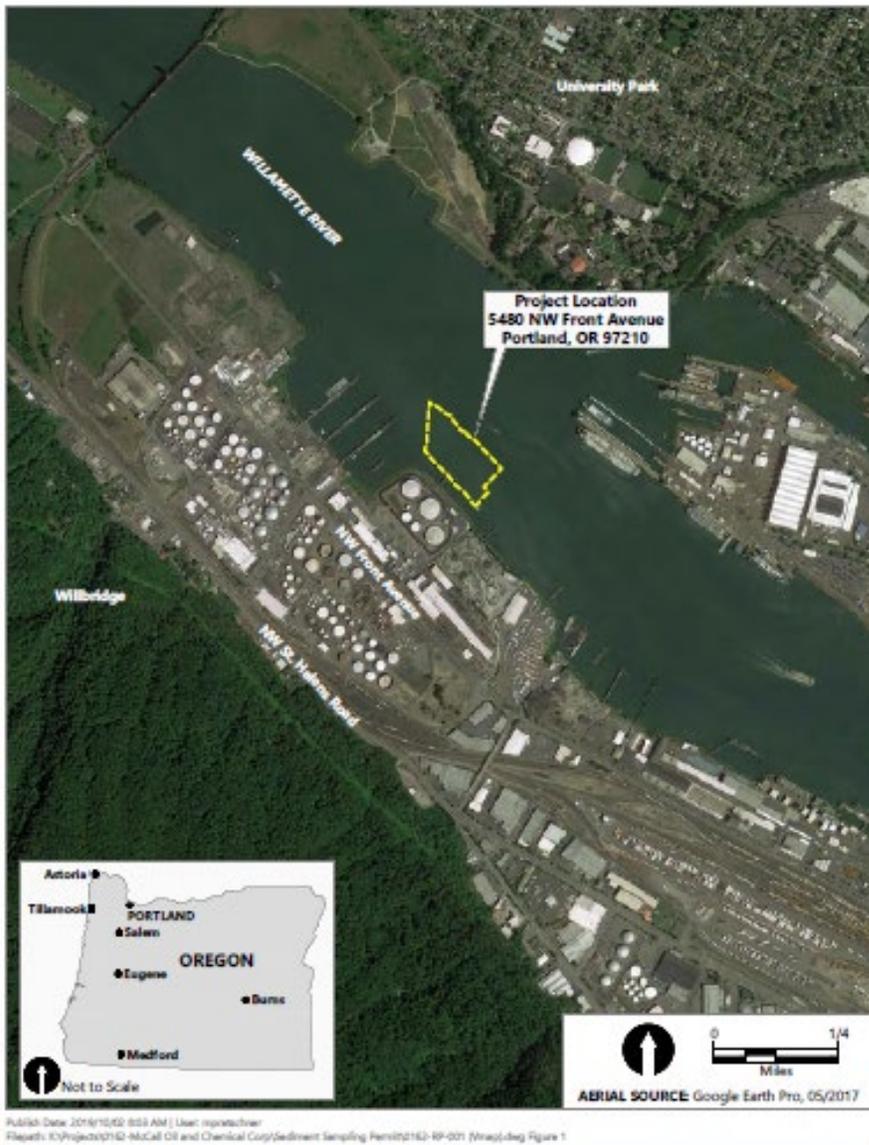


Figure 1. Vicinity map with project location outlined in yellow.

The project includes initial maintenance dredging of up to 60,500 cubic yards (cy) of sediment in 2020 to ensure continued vessel access to the pier, and a 9-year maintenance dredging program of up to 95,000 cy for a total of 155,500 cy over 10 years. The project also includes maintenance dredging in an area approximately 800 to 1,020 feet long by 460 feet wide along the existing pier to re-establish adequate berthing depths. Maintenance dredging of the MOCC berthing area would occur within the limits of previously permitted dredged areas both inside and outside of the Lower Willamette River Federal Navigation Channel (Willamette River FNC). Both of these areas have been authorized to a depth of -40 feet (+3 feet of overdredge) Columbia River Datum (CRD). However, MOCC is not currently proposing to restore its berthing areas to -40 feet CRD because most of the Willamette River FNC is much shallower than the authorized depth and also in need of maintenance dredging. Willamette River FNC maintenance dredging has been restricted while remediation requirements for the Portland Harbor Superfund site are being resolved.

For areas identified by Portland Sediment Evaluation Team (PSET) and EPA during the PSET review process as exceeding post-dredge surface Sediment Evaluation Framework (SEF) screening levels and Portland Harbor Remedial Action Levels (RALs), a 1-foot-thick clean sand or sand-gravel cover would be placed over the post-dredge surface to minimize exposure. A deck barge and tug would be used to transfer sand and or sand-gravel cover material to the Project Site. Cover material would be placed from a barge using a spreader bucket, to a thickness of 1.0 foot (approximately 1,740 cy total), as determined in coordination with EPA or PSET.

In future years that would be covered under the Corps' permit, MOCC may choose to restore its berthing area to -40 feet CRD upon completion of appropriate sediment characterization. The proposed 10-year maintenance dredging volume includes approximately 45,000 cy to account for the volume of sediment necessary to restore depths to -40 feet CRD. In subsequent years of the maintenance dredging program, MOCC may collect additional sediment core samples, as necessary, based on recency requirements and MOCC's need to fully restore its previous berthing depth, to demonstrate compliance with the applicable requirements of the Sediment Evaluation Framework (SEF; RSET 2018) and the PSET. The material collected as part of the sediment core sampling would add an insignificant amount to the overall volume of material proposed to be removed for maintenance dredging (less than 10 cy).

The MOCC property is located on the west bank of the Willamette River near river mile (RM) 7.8, in Township 1N, Range 1E, in the SW quadrant of Section 18. The MOCC property includes upland storage facilities and a pier in the Willamette River where barges and tankers dock to load or unload liquid or viscous materials including asphalt, renewable diesel, biodiesel fuels, and ultra-low-sulfur diesel. The Project Site is defined as the berth for the existing pier. The berth begins approximately 175 feet waterward of the ordinary high water mark (OHWM) at the existing breasting dolphins and extends approximately 460 feet waterward. Water depths in the berth have decreased since the last permitted maintenance dredging event in 1993 (NWP-93-134) due to natural deposition as a result of channel morphology and due to shoaling. Channel depths at the breasting dolphins currently range from -28 feet to -32 feet CRD. Vessels that draft below -28 feet CRD (fully or partially loaded) are not currently able to access the pier because of limited water depths.

The proposed action would occur during the approved in-water work window between July 1 and October 31 in 2020 and future years, over the expected 10-year duration of the Corps' maintenance dredging permit. All maintenance dredging in each year is expected to be completed within this window. Any further maintenance work in any year after the initial event would be coordinated by MOCC and appropriate regulatory staff to avoid conflict with any work proposed to occur near MOCC's site to complete a remedial action.

The following general BMPs would be implemented to minimize environmental effects during construction:

- Water quality monitoring would be performed consistent with requirements of the Clean Water Act Section 401 WQC. The WQC is expected to include provisions for turbidity monitoring and appropriate tiered responses if exceedances are detected or if injured or dead listed species are observed in the Project Site. Responses may include, but are not limited to, slowing work, stopping work, or providing more intense monitoring.
- Prior to initially entering the water, all equipment would be checked for leaks and completely cleaned of any external petroleum products, hydraulic fluid, coolants, or other deleterious materials.
- The contractor shall be responsible for the preparation of a Spill Prevention, Control, and Countermeasures (SPCC) Plan to be used for the duration of the Project. The SPCC Plan shall be submitted for approval by the Project engineer prior to the commencement of any construction activities.
- A copy of the SPCC Plan and any updates would be maintained at the Project Site by the contractor and would include the following:
 - The SPCC Plan shall identify Project construction elements and recognize potential spill sources at the site. The SPCC Plan shall outline responsive actions in the event of a spill or release and shall describe notification and reporting procedures. The SPCC Plan shall outline contractor management elements such as personnel responsibilities, Project Site security, site inspections, and training.
 - The SPCC Plan would outline what measures shall be taken by the contractor to prevent the release or spread of hazardous materials, including materials encountered during construction but not identified in contract documents and any hazardous materials that the contractor stores, uses, or generates on the construction site during construction activities. These items include, but are not limited to, gasoline, oils, and chemicals. Hazardous materials are defined in Oregon Revised Statutes 453.005(7) under "hazardous substance."
 - The contractor shall maintain at the job site the applicable equipment and materials designated in the SPCC Plan.

Avoidance and minimization measures for during dredging activities include the following:

- Appropriate BMPs would be employed to minimize sediment loss and turbidity generation during dredging. BMPs may include, but are not limited to, the following:
 - Eliminating multiple bites while the bucket is on the bottom
 - No stockpiling of dredged material on the riverbed
 - No riverbed leveling

- Use of a closed-lipped bucket (e.g., environmental level-cut bucket) as the primary dredge bucket, which is an anticipated condition of the CWA 401 water quality certification (WQC).
- Controlled dredging in slope areas to minimize sloughing
- Use of floating absorbent booms to capture floating debris or sheen
- Additional BMPs or engineering controls to be implemented as contingency measures, as determined necessary based on observed water quality monitoring results and working conditions
- Other conditions as specified in the Section 401 WQC
- Turbidity monitoring would be conducted during dredging activities in accordance with the WQC for this Project. If a water quality exceedance occurs during monitoring, enhanced BMPs may be implemented to further control turbidity. Enhanced BMPs may include, but are not limited to, the following:
 - Slowing the velocity (i.e., increasing the cycle time) of the ascending loaded environmental bucket through the water column
 - Pausing the dredge bucket near the bottom while descending and near the water surface while ascending
- Barges would be filled to less than 85% to 90% of their capacity. The load would be placed in the barge to maintain an even keel and avoid listing.
- Dredge barges would utilize straw or filter fabric placed over the barge scuppers to filter suspended sediment from the barge effluent.
- Dredging would be performed by experienced dredge operators.
- The potential for sediment scour would be minimized to the extent practicable through careful movement of the contractor vessels within the work site.
- Precision dredging software (e.g., Dredgepack) would be used to accurately position the dredge bucket to avoid overdigging or oversteepening of the dredge cut.
- Dredge vessel personnel would be trained in hazardous material handling and spill response and would be equipped with appropriate response tools, including absorbent oil booms. If a spill occurs, spill cleanup and containment efforts would begin immediately and take precedence over normal work.
- The dredging contractor would regularly inspect fuel hoses, oil or fuel transfer valves, and fittings for drips or leaks in order to prevent spills into the surface water.

Avoidance and minimization measures for transport and offloading of dredged materials may include the following:

- Barges would be visually inspected for any sediment adhered to the sides of the barge that could enter the river during transport. Contractor personnel would remove any such sediment and place it inside the barge before the barge leaves the work site.
- Visual monitoring and, if necessary, follow-up turbidity measurements would be conducted around the barge at the removal site and in transit to the transloading location to confirm that material is not being released during loading, transport, and offloading.
- Barges leaving the work area would be sealed such that no discharge of water or suspended sediment occurs in the receiving waters.
- Transport and offloading of dredged material would be managed to contain the material and avoid spillage. Spill control measures, including spill plates and aprons and upland

spill control curbing and collection systems, would be employed when transferring dredged material from the haul barges to trucks or trains for disposal at the upland disposal facility.

- Routine visual inspections would be implemented at the loading and offloading areas.
- In the event of high river flows, storms, or high wave conditions, or if conditions appear to pose a threat to meeting Project environmental goals, transfer operations may be limited or suspended at the transfer facility.

Impact avoidance and minimization measures for placement of sand or sand-gravel cover include the following:

- Volume, tonnage, and bathymetric progress surveys would be used to confirm adequate coverage and thickness have been achieved during and after material placement.
- Imported materials would consist of clean, granular material free of contaminants or deleterious materials and conform to Project specifications, including specified gradations.
- If turbidity exceedances occur during material placement, enhanced BMPs may be implemented as follows:
 - Placement activities should be progressively slowed until turbidity exceedances are no longer detected outside of the compliance boundary.
 - Monitoring would continue following the slowing of material placement activities until turbidity measurements return to acceptable levels.

NMFS relied on the foregoing description of the proposed action, including all features identified to reduce adverse effects, to complete this consultation. To ensure that this opinion remains valid, NMFS requests that the action agency or applicant keep NMFS informed of any changes to the proposed action.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued

existence of” a listed species, which is “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

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

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

The 2019 regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms “effects” and “consequences” interchangeably.

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

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

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and

listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the essential PBFs that help to form that conservation value.

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

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Abatzoglou et al. 2014; Kunkel et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote et al. 2014). Decreases in summer precipitation of as much as 30% by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2013; 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).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009). Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua et al. 2010; Isaak et al. 2012). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier et al. 2011; Tillmann and Siemann 2011; Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer et al. 1999; Winder and Schindler 2004, Raymondi et al. 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Wainwright and Weitkamp 2013; Raymondi et al. 2013).

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

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

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. Acidification also impacts sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely et al. 2012, Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011, Reeder et al. 2013). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007).

Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005; Zabel et al. 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011, Reeder et al. 2013).

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these ESUs (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic consequences for 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 Species

Table 1, 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 1. 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
Lower Columbia River Chinook salmon	Threatened 6/28/05	NMFS 2013	NWFSC 2015	This ESU comprises 32 independent populations. Twenty-seven populations are at very high risk, 2 populations are at high risk, one population is at moderate risk, and 2 populations are at very low risk Overall, there was little change since the last status review in the biological status of this ESU, although there are some positive trends. Increases in abundance were noted in about 70% of the fall-run populations and decreases in hatchery contribution were noted for several populations. Relative to baseline VSP levels identified in the recovery plan, 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.	<ul style="list-style-type: none"> • 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

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Upper Willamette River Chinook salmon	Threatened 6/28/05	NMFS 2011a	NWFSC 2015	<p>This ESU comprises seven populations. Five populations are at very high risk, one population is at moderate risk (Clackamas River) and one population is at low risk (McKenzie River). Consideration of data collected since the last status review in 2010 indicates the fraction of hatchery origin fish in all populations remains high (even in Clackamas and McKenzie populations). The proportion of natural origin spawners improved in the North and South Santiam basins, but is still well below identified recovery goals. Abundance levels for five of the seven populations remain well below their recovery goals. Of these, the Calapooia River may be functionally extinct and the Molalla River remains critically low. Abundances in the North and South Santiam rivers have risen since the 2010 review, but still range only in the high hundreds of fish. The Clackamas and McKenzie populations have previously been viewed as natural population strongholds, but have both experienced declines in abundance despite having access to much of their historical spawning habitat. Overall, populations appear to be at either moderate or high risk, there has been likely little net change in the VSP score for the ESU since the last review, so the ESU remains at moderate risk.</p>	<ul style="list-style-type: none"> • 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

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Lower Columbia River coho salmon	Threatened 6/28/05	NMFS 2013	NWFSC 2015	<p>Of the 24 populations that make up this ESU, 21 populations are at very high risk, 1 population is at high risk, and 2 populations are at moderate risk. Recent recovery efforts may have contributed to the observed natural production, but in the absence of longer term data sets it is not possible to parse out these effects. Populations with longer term data sets exhibit stable or slightly positive abundance trends. Some trap and haul programs appear to be operating at or near replacement, although other programs still are far from that threshold and require supplementation with additional hatchery-origin spawners. Initiation of or improvement in the downstream juvenile facilities at Cowlitz Falls, Merwin, and North Fork Dam are likely to further improve the status of the associated upstream populations. While these and other recovery efforts have likely improved the status of a number of coho salmon populations, abundances are still at low levels and the majority of the populations remain at moderate or high risk. For the Lower Columbia River region land development and increasing human population pressures will likely continue to degrade habitat, especially in lowland areas. Although populations in this ESU have generally improved, especially in the 2013/14 and 2014/15 return years, recent poor ocean conditions suggest that population declines might occur in the upcoming return years</p>	<ul style="list-style-type: none"> • 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
Lower Columbia River steelhead	Threatened 1/5/06	NMFS 2013	NWFSC 2015	<p>This DPS comprises 23 historical populations, 17 winter-run populations and six summer-run populations. Nine populations are at very high risk, 7 populations are at high risk, 6 populations are at moderate risk, and 1 population is at low risk. The majority of winter-run steelhead populations in this DPS continue to persist at low abundances. Hatchery interactions remain a concern in select basins, but the overall situation is somewhat improved compared to prior reviews. Summer-run steelhead populations were similarly stable, but at low abundance levels. The decline in the Wind River summer-run population is a source of concern, given that this population has been considered one of the healthiest of the summer-runs; however, the most recent abundance estimates suggest that the decline was a single year aberration. Passage programs in the Cowlitz and Lewis basins have the potential to provide considerable improvements in abundance and spatial structure, but have not produced self-sustaining populations to date. Even with modest improvements in the status of several winter-run DIPs, none of the populations appear to be at fully viable status, and similarly none of the MPGs meet the criteria for viability.</p>	<ul style="list-style-type: none"> • 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

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Upper Willamette River steelhead	Threatened 1/5/06	NMFS 2011a	NWFSC 2015	<p>This DPS has four demographically independent populations. Three populations are at low risk and one population is at moderate risk. Declines in abundance noted in the last status review continued through the period from 2010-2015. While rates of decline appear moderate, the DPS continues to demonstrate the overall low abundance pattern that was of concern during the last status review. The causes of these declines are not well understood, although much accessible habitat is degraded and under continued development pressure. The elimination of winter-run hatchery release in the basin reduces hatchery threats, but non-native summer steelhead hatchery releases are still a concern for species diversity and a source of competition for the DPS. While the collective risk to the persistence of the DPS has not changed significantly in recent years, continued declines and potential negative impacts from climate change may cause increased risk in the near future.</p>	<ul style="list-style-type: none"> • 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

2.2.2 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 2005). 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.

A summary of the status of critical habitats, considered in this opinion, is provided in Table 2, below.

Table 2. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion.

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 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.
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.
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.

2.3 Action Area

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

The project boundary is located in the Willamette River at RM 7.8. Most of the area proposed for maintenance dredging is within the Willamette River FNC. Sediment Management Areas for the Portland Harbor Superfund site are present at the shoreline of the MOCC property but would not be disturbed as part of the maintenance dredging activities. The action area includes the area to be dredged as well as 1/2 mile upstream and downstream from the dredge prism. These numbers are based on the estimated worst-case extent of turbidity dispersion during a complete tidal cycle during dredging and cover layer placement given the fine grained nature of the sediments to be dredged.

Five ESA-listed species use the action area for adult migration, juvenile rearing, and migration. Critical habitat has been designated for all species. The action area is designated EFH for Chinook salmon and coho salmon (Pacific Fishery Management Council 2014), and is an area where environmental effects of the proposed action may adversely affect EFH of those species. The effects to EFH are analyzed in the MSA portion of the document.

2.4 Environmental Baseline

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

The climate change effects on the environmental baseline are described in Section 2.2, above.

During recent years, NMFS has engaged in various Section 7 consultations on Federal projects affecting these populations and their habitats in the vicinity of the action area, and those consequences have been taken into account in this opinion. These consultations include consultations on dredging, dock maintenance and repair, and restoration in and near the action area, recently including the Centennial Mills Dock Demolition (WCR-2016-4403), the Chevron Front Street Dock Repair (WCR-2017-6704), the Vigor Industrial Fender Pile Maintenance (WCR-2017-7963), the Tidewater Philips 66 Pier Repair (WCR-2017-8078), the McCall Oil Fender Pile Replacement (WCR-2016-5012), the Kinder Morgan Pile Replacement and Dock Maintenance (WCR-2014-1671), the TEMCO Piling Replacement (WCR-2014-285), the CalPortland Terminal Fender Pile Replacement (WCR-2014-522), the Gunderson Pile Replacement (WCR-2014-592), the Ash Grove Cement Company Fender Pile System

Replacement (WCRO-2019-00010), the Phillips 66 Fender Pile Replacement (WCRO-2019-01598), the Shell Oil Portland Bulk Terminal Removal (WCR-2017-6906), the University of Portland Habitat Restoration and Dock Construction (WCR-2017-6909), the Lower Willamette River Ecosystem Restoration Projects (WCR-2014-633), the Draft Restoration Plan for the Portland Harbor Superfund Site (WCR-2014-1581), the Alder Creek Mill Restoration (NWR-2012-9429), the Vigor Shipyard Dredging (NWR-2013-10001), the Glacier Northwest Dredging (WCR-2015-2734), the NW Natural PGM Remedy Construction (WCRO-2019-00008), the TLP Management Services Dredging and Capping (WCRO-2019-00011), the Port of Portland's Terminal-Wide Maintenance Dredging (NWR-2012-3169), and J.R. Simplot Rivergate Terminal Maintenance Dredging Willamette River (WCRO-2019-02355).

Habitat conditions within the LWR are highly degraded. The streambanks have been channelized, off-channel areas removed, tributaries put into pipes, and the river disconnected from its floodplain as the lower valley was urbanized. Silt loading to the LWR has increased over historical levels due to logging, agriculture, road building, and urban and suburban development within the watershed. Limited opportunity exists for large wood recruitment to the LWR due to the paucity of mature trees along the shoreline, and the lack of relief along the shoreline to catch and hold the material. The LWR has been deepened and narrowed through channelization, diking and filling, and much of the shallow-water habitat (important for rearing juvenile salmonids) has been converted to deep water habitat; 79% of the shallow water through the lower river has been lost through historic channel deepening (Northwest Power and Conservation Council 2004). Most recently, the Federal Navigation Channel at Post Office Bar was dredged in October 2011. Additionally, much of the historical off-channel habitat (also important habitat for juvenile salmonids) has been lost due to diking and filling of connected channels and wetlands. Gravel continues to be extracted from the river and floodplain and much of the sediment that would otherwise move downstream in the Willamette River is blocked by dams. All of these river changes contribute to the factors limiting recovery of ESA-listed salmonids using the action area.

The LWR through the City of Portland is highly developed for industrial, commercial and residential purposes. Much of the river is fringed by seawalls or riprapped embankments. Water quality in the action area reach of the Willamette River reflects its urban location and disturbance history. The LWR is currently listed on the Oregon Department of Environmental Quality (DEQ) Clean Water Act 303(d) List of Water Quality Limited Water Bodies. DEQ-listed water quality problems identified in the action area include toxics, biological criteria (fish skeletal deformities), bacteria (fecal coliform), and temperature. Cleanup of contaminated sediments in the LWR is presently being addressed under the Federal Superfund process. Sediment sampling in the action area has identified the presence of elevated levels of ammonia.

Juvenile and adult Chinook salmon, coho salmon, and steelhead use this area as a migratory corridor and as rearing habitat for juveniles (Friesen 2005). All populations of UWR species use the action area, but only the Clackamas River populations of the LCR species occur here. The results of the Friesen study demonstrate that juvenile salmon and steelhead are present in the LWR nearly year-round. Of the more than 5,000 juvenile salmonids collected during the study, over 87% were Chinook salmon, 9% were coho salmon, and 3% were steelhead. Friesen concluded that the Chinook salmon juveniles were largely spring-run stocks that rear in fresh

water for a year or more before migrating to the ocean. Chinook salmon juveniles caught exhibited a bimodal distribution in length, indicating the presence of both subyearlings and yearlings. Although at lower abundance, coho salmon juveniles also exhibited this bimodal distribution of yearlings and subyearlings. The abundance of all juvenile salmon and steelhead increased beginning in November, peaked in April, and declined to near zero by July. Some of the larger juveniles may spend extended periods of time in off-channel habitat. Mean migration rates of juvenile salmon and steelhead ranged from 1.68 miles/day for steelhead to 5.34 miles/day for sub-yearling Chinook salmon. Residence time in the LWR ranged from 4.9 days for Chinook to 15.8 days for steelhead. Catch rates of juvenile salmon were significantly higher at sites composed of natural habitat (e.g., beaches and alcoves).

Steelhead are not known to spawn in the mainstem of the Willamette River in the vicinity of the action area. Chinook salmon may spawn upstream of the action area in the lower end of the Clackamas River or in the Willamette River just below Willamette Falls, where suitable gravel-type substrate for spawning may occur, and in Johnson Creek. Recent observations of coho salmon juveniles in Miller Creek (tributary at RM 3 on the Willamette River) and in Johnson Creek by City of Portland biologists suggest that coho spawning may occur in small tributaries in the LWR.

Adult Chinook salmon and steelhead have been documented holding in the LWR for a period of time before moving upriver. Adults migrate upstream to spawn during early spring (spring Chinook salmon), early fall (coho salmon), and late fall through winter (steelhead), and spawn in early to mid-fall (Chinook and coho salmon) and spring (steelhead). Adult steelhead have been documented entering the mouth of the Clackamas River with a darkened coloration, indicating that they have been in freshwater for some time.

Friesen (2005) contradicts the longstanding assumption that UWR Chinook salmon overwinter and grow in their natal streams, then pass quickly through the LWR corridor during a springtime migration toward the sea. Instead, he found juvenile hatchery and naturally-spawned Chinook salmon to be present and growing in the LWR during every month of the year, often at a faster rate than in other areas, although they were most abundant during winter and spring. In contrast, juvenile coho salmon and steelhead generally were rare except during winter and spring. Therefore, juvenile Chinook salmon will be present in the river during the proposed action, and there will likely be a few LCR coho salmon and steelhead juveniles present as well. Critical habitat in the action area provides a critical migration corridor and important rearing habitat with high conservation value.

2.5 Effects of the Action

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

The proposed action will affect the salmonid species considered in this opinion by exposing them to physical, chemical, and biological changes to the environment, and through direct impacts on individual fish. These effects include a short-term reduction in water quality from increased turbidity caused by suspended sediment during dredging. Dredging in DMMUs 8 and 9 could suspend contaminants found in sediments sampled in those dredge prisms during dredging and cover layer placement. Additionally, there is a risk of entrainment during dredging, as well as a loss of benthic invertebrates due to dredging and cover layer placement, and harassment/displacement from project disturbances. There is also a small chance of an accidental contaminant release from construction equipment or activities; however, any release would likely be small and quickly contained due to the implementation of a spill prevention, control, and containment plan.

A beneficial effect of the proposed action is that the removal of contaminated sediments and placement of the clean cover layer over DMMUs 8 and 9 will help reduce exposure of chemical contaminants to juvenile salmonids and their prey.

The consequences of the proposed action on species and their habitat are described in detail below.

2.5.1 Effects on Listed Species

Effects from Disturbance. The disturbance caused by dredging and cover layer placement will affect the behavior of ESA-listed salmon and steelhead. Adults likely will be disturbed but able to respond by avoiding the work area. Juveniles are more likely to enter or remain in the area during disturbance, and those that do are likely to experience physiological stress caused by exposure to the physical disturbance during dredging; stress is likely to reduce growth, reduce lipid stores, and ultimately reduce fitness and survival in a small number of juveniles.

Effects from Entrainment. Entrainment of migrating and rearing fish by dredging equipment occurs when fish are trapped during the uptake of sediments and water by dredging machinery, which is likely to cause injury or death. The risk of entrainment is largely dependent upon the likelihood of fish occurring within the dredge prism, fish densities, dredging depth, the entrainment zone, location of dredging within the river, equipment operations, time of year, and the species' life stage. Low densities of ESA-listed salmonids are likely to be present in the action area during dredging. Fish are likely to be transitory in the entrainment zone, and the limited area of dredging lowers the likelihood of fish entrainment. The marginal quality of the habitat to be dredged should further reduce the risk of entrainment. However, based on previous evidence that dredging operations in the lower Columbia River can entrain juvenile salmon and steelhead (Larson and Moehl 1990; R2 Resources Consultants 1999, as cited in NMFS 2002), the proposed action is likely to injure or kill a few migrating and rearing juvenile salmon and steelhead. Core samples to be taken during the project's life would not be likely to entrain salmonids, but could result in some low level disturbance to fish in the vicinity of sampling locations.

Sedimentation and Turbidity Effects. Dredging and cover layer placement will result in the resuspension of sediment in the river. The fish response to suspended sediment and turbidity ranges from beneficial to detrimental. Elevated total suspended solids (TSS) have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates, and improve survival, but elevated TSS have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Although fish that remain in turbid waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998), chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Lloyd *et al.* 1987; Redding *et al.* 1987; Servizi and Martens 1991). Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, as well as the TSS concentration. Juvenile Pacific salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, unless the fish traverse these streams along migration routes (Lloyd *et al.* 1987). Sediments in the action area are predominantly fine-grained, so suspended sediments will settle out more slowly than would be the case with coarser grained sediment, increasing the duration of exposure. Elevated TSS is likely to occur over a relatively small area during dredging and cover layer placement. In addition, sediments in the action area are contaminated, and disturbing the sediments may mobilize some of the contaminants over a small area. Any suspended sediment and contaminants should dissipate soon after cessation of the activity.

Juvenile salmonids in the action area are primarily planktonic feeders in the summer, and therefore their ability to feed will decline in turbid waters. Depending on the concentrations of suspended solids, fish will either respond by seeking refuge in adjacent areas with less turbidity, or remain in the area, taking advantage of the additional cover. The risk of death or injury to ESA-listed salmonids from increases in TSS is low during the summer in-water work window when densities of juvenile fish are low. Behavioral responses are likely to occur and would include decreased foraging behaviors in the affected area, reducing juvenile growth and fitness in a small number of fish.

Given the relatively small area of river affected, the temporary duration of the construction activities, and the small number of ESA-listed salmonids likely to be exposed to elevated TSS and contaminants, only a few ESA-listed fish are likely to be affected.

Effects on Salmonid Prey. The relatively calm waters near the dredging area should allow particulates to settle out of the water column relatively quickly, limiting the exposure of fish to disrupted planktonic feeding in the action area to roughly 24 hours following the in-water activities. It is unlikely that dredging, cover layer placement, sediment sampling will result in more than minor, short-term changes in the pelagic forage community. Additional pelagic animals will move into the action area with river flows. Thus, pelagic feeding within the action area will be disrupted during dredging and cover layer placement for a short period of time, but the effects are likely to be small. Similarly, the transient, flow-induced movements of the salmonids' pelagic prey base should limit their exposure to contaminants.

The temporal extent of disruptions to benthic feeding during and following dredging and cover layer placement will be longer. The benthic invertebrate populations within the dredge prism will be absent until the new surface layer is colonized. The frequent activity in the area will likely

slow the development of a healthy benthic community at the project site, and the effects to benthic productivity and availability of prey items will last months to years after dredging is completed. A beneficial effect of the proposed action is that the removal of contaminated sediments and placement of the clean cover layer over DMMUs 8 and 9 will help reduce exposure of chemical contaminants to juvenile salmonid prey.

Effects to the prey base are likely to have minor, localized effects on juvenile salmonids rearing in the action area during and following the proposed action. The importance of the site as a rearing area for juvenile salmonids is limited; however, and the change in prey availability at the site will not alter generally available feeding opportunities for salmonids in the lower river. It is unlikely that the proposed action will result in more than a small reduction to the forage community in the lower river over the long term.

Summary of Effects on Listed Species. The presence/absence information for salmonids in the action area during the Willamette River summer in-water work window of July 1 through October 31 is provided in Table 3. The applicant proposes to complete all in-water work during this window. The peak upstream migration for adult LCR coho salmon and LCR Chinook salmon overlaps with the summer in-water work window, but otherwise, the overall number of listed salmonids in the lower Willamette River is at its lowest during this time. Densities of juvenile salmonids, the more sensitive and vulnerable life stage, are lowest in the summer months (Friesen 2005), and the summer in-water work window avoids peak smolt out-migration for juvenile ESA-listed salmonids that migrate through the action area. Therefore, the potential for direct interaction between construction equipment and salmon and steelhead will be significantly lower during the summer in-water work window than during the rest of the year because salmon presence is low.

Table 3. The presence/absence of ESA-listed salmonids in the lower Willamette River during the summer in-water work window (July 1 to October 31). ‘Y’ indicates the species is present, ‘Y-’ indicates that while the life stage may be present, peak migration is not at this time’, ‘N’ indicates that the species is not likely to be present.

Species	Summer In-water Work Window	
	Adult Migration	Juvenile Out-migration
LCR Chinook salmon	Y	Y-
UWR Chinook salmon	N	Y-
LCR coho salmon	Y	Y-
UWR steelhead	N	Y-
LCR steelhead	Y-	Y-

However, NMFS does expect some fish to be present during in-water work. Most of the fish present will incur some stress due reduced water quality and reduced forage during and after dredging and cover layer placement over DMMUs 8 and 9. Any non-lethal stress experienced by individual fish is likely to be brief (minutes to days). A few fish may be injured or killed by the culmination of joint causes, such as a previous wound inflicted by the environmental baseline and genetic weakness.

Considering the low abundance and short residence time of juvenile ESA-listed salmonids in the action area during the in-water work window, any effects to the growth, survival, and distribution of ESA-listed salmonids in the action area will be small and isolated. These effects are unlikely to be significant at either the local or population scale. The proposed action will have no effect on the long-term abundance trends of any populations addressed by this opinion.

2.5.2 Effects on Critical Habitat

Designated critical habitat within the action area for ESA-listed salmon and steelhead considered in this opinion consists of freshwater rearing sites and freshwater migration corridors and their essential physical and biological features (PBFs) as listed below. The effects of the proposed action on these features are summarized as a subset of the habitat-related effects of the action that were discussed more fully above.

Freshwater rearing

Floodplain connectivity – No effect.

Forage – Decreased quantity and quality of benthic forage due to removal during dredging, and burial during cover layer placement at DMMUs 8 and 9. Temporary decrease in pelagic forage due to suspended sediment in the water column.

Natural cover – Temporary increase in cover due to suspended sediment in the water column during dredging and cover layer placement.

Water quality – Increased suspended sediment and associated contaminants during and for a short period following dredging and cover layer placement at DMMUs 8 and 9.

Water quantity – No effect.

Freshwater migration

Free of artificial obstruction – Possible delayed juvenile migration during dredging.

Natural cover – Temporary increase in cover due to suspended sediment in the water column during dredging and cover layer placement.

Water quality – Increased suspended sediment and associated contaminants during and for a short period following dredging and cover layer placement.

Water quantity – No effect.

The proposed action is likely to cause minor, localized and temporary degradation of critical habitat PBFs for water quality, forage, and free passage. The critical habitat in the action area will retain its ability to provide rearing sites and freshwater migration corridors for the species considered in this opinion.

2.6 Cumulative Effects

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

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

For this action, state or private activities in the vicinity of the project location are expected to cause cumulative effects in the action area. Additionally, future state and private activities in upstream areas are expected to cause habitat and water quality changes that are expressed as cumulative effects in the action area. Our analysis considers: (1) how future activities in the Willamette basin are likely to influence habitat conditions in the action area, and (2) cumulative effects caused by specific future activities in the vicinity of the project location.

The action area has a high population density because it is in the Portland metropolitan area. The past effect of that population is expressed as changes to physical habitat and loadings of pollutants contributed to the Willamette River. These changes were caused by residential, commercial, industrial, agricultural, and other land uses for economic development, and are described in the Environmental Baseline (Section 2.4). The collective effects of these activities tend to be expressed most strongly in lower river systems where the consequences of numerous upstream land management actions aggregate to influence natural habitat processes and water quality.

Agriculture, hydropower facilities, timber harvest, fishing, mining and other resource-based industries caused many long-lasting environmental changes that harmed ESA-listed species and their critical habitats. Those include basin-wide loss or degradation of stream channel morphology, spawning substrates, instream roughness and cover, estuarine rearing habitats, wetlands, floodplains, riparian areas, water quality (*e.g.*, temperature, sediment, dissolved oxygen, contaminants), fish passage, and habitat refugia. Those changes reduced the ability of populations of ESA-listed species to sustain themselves in the natural environment by altering or interfering with their behavior in ways that reduce their survival throughout their life cycle. The environmental changes also reduced the quality and function of critical habitat PBFs that are necessary for successful spawning, production of offspring, and migratory access necessary for adult fish to swim upstream to reach spawning areas and for juvenile fish to proceed downstream and reach the ocean. Without those features, the species cannot successfully spawn and produce offspring.

Many of the activities described in Section 2.4 are ongoing and will continue into the future. Over time, the level of extraction of some natural resources and the associated habitat degradation in Oregon has declined and industry standards and regulatory requirements have improved. For instance, large-scale placer mining for gold (NRC 1995, Lichatowich 1999) has been replaced by smaller recreational mining operations. Timber harvest in Oregon has decreased from roughly 8.5 billion board feet in the 1980s to about 4 billion board feet in 2004 (Oregon Department of Forestry 2005). Timber harvest for Oregon from 2005 to 2010 ranged from 4.4 billion board feet to 2.7 billion board feet.¹ In 1971, Oregon passed the first comprehensive forest practices act in the nation. The law became effective on July 1, 1972, and implementation began immediately following adoption of the first set of forest practice rules (Everest and Reeves 2007). Although the Oregon Forest Practices Act and associated forest practice rules generally have become more protective of riparian and aquatic habitats over time, significant concerns remain over their ability to adequately protect water quality and salmon habitat (Everest and Reeves 2007, IMST 1999).

While widespread degradation of aquatic habitat associated with intense natural resource extraction is no longer common, ongoing and future land management actions are likely to continue to have a depressive effect on aquatic habitat quality in the Willamette basin. As a result, recovery of aquatic habitat is likely to be slow in most areas and cumulative effects at the basin-wide scale are likely to have a neutral to negative impact on population abundance trends and the quality of critical habitat PBFs.

The human population in the Portland area is likely to continue to grow in the foreseeable future (Portland State University 2012). No specific projection of future pollutant loadings in the Willamette River as a result of that population increase is available, but a larger population is likely to have a commensurate level of demand for residential, commercial, industrial, and other land uses that produce contaminants that enter rivers. Thus, it is likely that trends in habitat and water quality in the area of the proposed project will continue, but with changes as described below.

To counteract past trends in pollution of the LWR, State, tribal, local or private parties, including groups such as the Portland Harbor responsible parties, together with non-Federal members of the Portland Harbor Natural Resource Trustee Council acting in their own capacity, are reasonably certain to continue taking aggressive actions to reduce toxic pollution and runoff to the Willamette River from all sources (U.S. EPA 2011; U.S. EPA 2017). Those actions include public education, increased toxic reduction and clean-up actions, monitoring to better identify and control sources, research into ecosystem effects of toxic pollutants, and development of a regional data management system. Upland remediation activities are often unlikely to have a Federal nexus for NMFS and thus will not be the subject of a section 7 consultation for NMFS species. However, these future actions will likely lead to a significant reduction in the volume of some pollutants delivered to the LWR, although data are still insufficient to identify a trend in the concentration of most of those contaminants in the water itself (Johnson *et al.* 2005; U.S. EPA 2009; U.S. EPA 2011). We did not find any other specific information about non-Federal actions reasonably certain to cause cumulative effects in the action area.

¹ Data available at: http://www.oregon.gov/ODF/Pages/state_forests/frp/Charts.aspx (accessed Sept. 2013)

2.7 Integration and Synthesis

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

All adult UWR Chinook salmon and UWR steelhead must migrate through the action area to the Upper Willamette River basin and all juvenile UWR Chinook salmon and UWR steelhead must migrate from the Upper Willamette River basin to the ocean through the action area. Therefore, individuals from all populations of these two species are reasonably likely to be affected by the proposed action. The LCR Chinook salmon, LCR steelhead and LCR coho salmon individuals in the action area are likely to be from the Clackamas River populations and must also pass through the action area as juveniles and adults. Over the past several years, NMFS has engaged in various Section 7 consultations on Federal projects impacting these populations and their habitats, and the consequences of those projects have been taken into account in this opinion as part of the environmental baseline.

The current extinction risk for UWR Chinook salmon is very high and the recovery goal is for the extinction risk to become very low. The current extinction risk for UWR steelhead is low and the recovery goal is for the extinction risk to become very low. The current extinction risk for the Clackamas River population of LCR Chinook salmon is very high and the recovery goal is for the extinction risk to reduce to medium. The current extinction risk for the Clackamas River population of LCR coho salmon is medium and the recovery goal is for the extinction risk to become very low. The current extinction risk for the Clackamas River population of LCR steelhead is medium and the recovery goal is for the extinction risk to become low. The Clackamas River population is identified as a "core" population. To meet the ESU-viability criteria, representative populations, such as the Clackamas River population, need to achieve viability criteria or be maintained (ODFW 2010).

The environmental baseline is such that individual ESA-listed salmonids in the action area are exposed to reduced water quality, lack of suitable riparian and aquatic habitat and restricted movement due to developed urban areas and land use practices. These stressors, as well as those from climate change, already exist and are in addition to any adverse effects produced by the proposed action. Major factors limiting recovery of the ESA-listed salmonids considered in this opinion include degraded estuarine and nearshore habitat; degraded floodplain connectivity and function; channel structure and complexity; riparian areas and large wood recruitment; stream substrate, streamflow; fish passage; water quality; harvest and hatchery consequences ; predation/competition; and disease.

The effects of the proposed action on the factors limiting recovery for the ESA-listed salmonids considered in this opinion include a temporary reduction in water quality in the action area from

the increase in suspended sediment and associated contaminants during dredging and cover layer placement. The reduction in water quality will be short term (likely a few weeks) and limited to a relatively small area. Other effects include possible entrainment in the dredge bucket, disturbance from dredging, and a reduction in forage over a small area due to sediment removal and cover layer placement. Because these effects are relatively brief or small in scale, and only a few individual fish are likely to be exposed to them, an even smaller number of individuals are likely to be killed or injured.

The few adults and juveniles that are likely to be injured or killed due to the action are too few to cause a more than a minor effect on the long-term abundance, productivity, genetic diversity, or spatial diversity of any affected population. This is primarily because the number of fish within the action area during in-water work will be extremely small when compared to the total abundance of individuals within each the populations affected by this action. Therefore, the effects of the proposed action will not reduce the productivity or survival of the affected populations of LCR Chinook salmon, UWR Chinook salmon, LCR steelhead, UWR steelhead or LCR coho salmon, even when combined with a degraded environmental baseline and additional pressure from cumulative effects and climate change.

The value of critical habitat for these species in the LWR is limited by poor water quality, altered hydrology, lack of floodplain connectivity and shallow-water habitat, and lack of complex habitat to provide forage and cover. The action area is in an urban area where the habitat has been degraded due to past land use practices including stormwater runoff and industrial and urban development. Despite this, the critical habitat in the action area has a high conservation value for LCR Chinook salmon, LCR steelhead, LCR coho salmon, UWR Chinook salmon, and UWR steelhead due to its critical role for rearing and migration.

The same effects of the proposed action that will have an effect on ESA-listed salmon and steelhead will also have an effect on critical habitat PBFs for salmon and steelhead critical habitat. The proposed action is likely to result in a short-term reduction in the quality and function of critical habitat PBFs in the action area during and after dredging and cover layer placement due to water quality and free passage effects, with a medium-term reduction due to forage effects.

The effects of this action will not substantially lower the quality and function of the necessary habitat attributes in the action area over the long term. At the watershed scale, the proposed action will not increase the extent of degraded habitat within the basin, add to the degradation of water quality, or further decrease limited rearing areas or limit access to rearing habitat. Even when cumulative effects and climate change are included, the proposed action will not negatively influence the function or conservation role of critical habitat at the watershed scale. Critical habitat for LCR Chinook salmon, LCR steelhead, UWR Chinook salmon, and UWR steelhead, and LCR coho salmon will remain functional, or retain the current ability for the PBFs to become functionally established, to serve the intended conservation role for the species, in this case, to provide freshwater rearing sites and migration corridors.

For all the reasons described above, the proposed action will not appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing their numbers,

reproduction or distribution; nor will the proposed action reduce the value of designated critical habitat for the conservation of the species.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and their designated 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, UWR Chinook salmon, LCR coho salmon, LCR steelhead, or UWR steelhead or destroy or adversely modify their 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 incidental take is reasonably certain to occur as follows:

- Harm among juveniles of all ESA-listed salmon and steelhead considered in this opinion due to impaired feeding, resting, and refuge from predators related avoidance of interaction with construction equipment during dredging and cover layer placement.
- Death of a few juveniles of all ESA-listed salmon and steelhead considered in this opinion due to entrainment in the dredge bucket.
- Harm among juveniles of all ESA-listed salmon and steelhead considered in this opinion due to reduced access to forage species related to the removal of benthic substrate during dredging and burial during cover layer placement at DMMUs 8 and 9.
- Harm to juveniles and adults of all ESA-listed salmon and steelhead considered in this opinion due to a temporary increase in suspended sediment and associated contaminants during dredging and cover layer placement.

The distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic,

population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action. In such circumstances, NMFS cannot provide an amount of take that would be caused by the proposed action.

The best available indicators for the extent of take are:

1. For harm associated with disturbance from construction, removal of access to forage species, and death due to entrainment: the area of the river used by ESA-listed salmonids as habitat that will be disturbed by dredging and cover layer placement. Specifically, the anticipated take will be exceeded if the final dredge area exceed 11 acres in size, (i.e., 1020 ft x 460 ft / 43,560 sq ft). This take indicator operates as an effective reinitiation trigger because the Corps has authority to conduct compliance inspections and to take actions to address non-compliance, including post-construction (33 CFR 326.4);
2. For harm associated with an increase in suspended sediment and associated contaminants: the extent of suspended sediment plumes. Specifically, the anticipated take will be exceeded if increased suspended sediment from dredging or cover layer placement causes suspended sediment plumes 300 feet from the boundary of the dredging area, as measured in nephelometric turbidity units (NTUs), to exceed 5 NTU over the background level. This take indicator operates as an effective reinitiation trigger because the Corps has authority to conduct compliance inspections and to take actions to address non-compliance (33 CFR 326.4).

These features best integrate the likely take pathways associated with this action, are proportional to the anticipated amount of take, and are the most practical and feasible indicators to measure. In particular, the size of the dredge prism is directly correlated to the area over which harm due to disturbance and interaction with equipment during dredging and cover layer placement is likely to occur, as well as the area over which benthic forage species access will be removed and entrainment could occur, and thus the number of individuals harmed or killed, as well as the level of consequences to species (the more substrate is removed during dredging and covered with the new layer, the less benthic forage is available in the area). In addition, the extent of suspended sediment plumes rationally reflects the amount of take from suspended sediment and associated contaminants caused by dredging and cover layer placement because larger sediment plumes are correlated with harm to a larger number of individual fish.

Exceeding either of the indicators for extent of take will trigger the reinitiation provisions of this opinion.

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).

The Corps shall:

1. Minimize incidental take from project-related activities by applying conditions to the proposed action that avoid or minimize adverse effects to water quality and the ecology of aquatic systems.
2. Ensure completion of a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.9.4 Terms and Conditions

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

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

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

1. The following terms and conditions implement reasonable and prudent measure 1:
 - a. Work Window. To minimize effects to juvenile salmonids, the applicant must limit all project activities conducted below ordinary high water to the in-water work window of July 1-October 31.
 - b. Notice to Contractors. Before beginning work, the applicant must provide all contractors working on site with a complete list of Corps permit special conditions, reasonable and prudent measures, and terms and conditions intended to minimize the amount and extent of take resulting from in-water work.
 - c. Minimize Impact Area and Duration. The applicant must confine construction impacts to the minimum area and duration necessary to complete the project.
 - d. Conservation Measures. The applicant must carry out all relevant conservation measures from the proposed action section of this opinion as described.
 - e. No Deliberate Fallback or Redistribution. The applicant must complete all digging passes of the bucket without any material intentionally being returned to

the river. Dumping of partial or full buckets of dredged material back into the river is not allowed. Dredging of holes or sumps below the maximum depth, and redistribution of sediment by dredging, dragging or other means is not allowed. The applicant must implement other bucket control techniques such as not overfilling the bucket, closing the bucket as slowly as possible on the bottom, pausing before hoisting the bucket off of the bottom to allow any overage to settle near the bottom, hoisting the load very slowly, "slamming" open the bucket after material is dumped on a barge to dislodge any additional material that is potentially clinging to the bucket, and ensuring that all material has been dumped into the barge from the bucket before returning for another bite.

- f. Debris. The applicant must remove all large anthropogenic debris from dredged sediments and transport it to an appropriate disposal site.
- g. Cycling Time. The applicant must slow cycling time, as necessary, to reduce resuspension of sediment and reduce sediment drift to adjacent areas.
- h. Turbidity. The applicant must conduct monitoring and reporting as described below. Monitoring must occur each day during daylight hours when in-water work is being conducted.
 - i. Representative background point. An observation must be taken every 2 hours at a relatively undisturbed area at least 600 feet up current from in-water disturbance to establish background turbidity levels for each monitoring cycle. Background turbidity, location, time, and tidal stage must be recorded prior to monitoring down current.
 - ii. Compliance point. Monitoring must occur every 2 hours approximately 300 feet down current from the point of disturbance and be compared against the background observation. The turbidity, location, time, and tidal stage must be recorded for each sample.
 - iii. Compliance. Results from the compliance points must be compared to the background levels taken during that monitoring interval. Turbidity may not exceed an increase of 5 NTU above background at the compliance point during work.
 - iv. Exceedence. If an exceedence occurs, the applicant must modify the activity and continue to monitor every 2 hours. If an exceedence over the background level continues after the second monitoring interval, then work must stop and NMFS must be notified so that revisions to the BMPs can be evaluated.
 - v. If the weather conditions are unsuitable for monitoring (heavy fog, ice/snow, excessive winds, rough water, *etc.*), then operations must cease until conditions are suitable for monitoring.
 - vi. Copies of daily logs for turbidity monitoring must be available to NMFS upon request.
- i. Contaminant Containment. The applicant must deploy an absorptive boom during all dredging activities to capture contaminants that may be floating on the water surface as a consequence of these activities.

2. The following term and condition implements reasonable and prudent measure 2:
 - a. Reporting. The applicant must report all monitoring items to NMFS within 60 days of the close of any work window that had in-water work within it, including turbidity observations, length and width of dredged area, volume of sediment removed, and dates of initiation and completion of in-water work. . The applicant must also 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 #1, above.
 - b. The applicant must submit monitoring reports to:
National Marine Fisheries Service
Oregon Washington Coastal Office
Attn: WCRO-2019-03305
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232-2778

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).

Identify and implement habitat enhancement or restoration activities in the LWR that:

- Increase the amount of shallow-water habitat in the reach to benefit ESA-listed salmonids
- Restore or create off-channel habitat or access to off-channel habitat, side channels, alcoves, wetlands, and floodplains
- Remove old docks and piles that are no longer in use
- Protect and restore riparian areas to improve water quality, provide long-term supply of large wood to streams, and reduce impacts that alter other natural processes
- Improve or regrade and revegetate streambanks
- Restore instream habitat complexity, including large wood placement
- Remove invasive plant species from upland vegetation and plant native species

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

2.11 Reinitiation of Consultation

This concludes formal consultation for the McCall Oil Maintenance Dredging on the Willamette River.

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

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

Section 305(b) of the MSA directs Federal agencies to consult with 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 Corps and descriptions of EFH for 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 proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of Chinook and coho salmon as identified in the Fishery Management Plan for Pacific coast salmon (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, NMFS concludes that the proposed action will have adverse consequences for EFH designated for Chinook and coho salmon. These consequences include a temporary reduction in water quality from increased suspended sediment and associated contaminants, a loss of benthic invertebrates due to sediment removal and cover layer placement, and harassment/displacement or entrainment caused by dredging operations.

3.3 Essential Fish Habitat Conservation Recommendations

NMFS recommends that the Corps carry out the following conservation recommendations to avoid, mitigate, or offset the impact of the proposed action on EFH. These conservation recommendations are identical to the ESA terms and conditions:

1. Carry out Terms and Conditions to implement Reasonable and Prudent Measure 1 regarding adverse effects to water quality and the ecology of aquatic systems.
2. Carry out Terms and Conditions to implement Reasonable and Prudent Measure 2 regarding monitoring and reporting.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, approximately 9.4 acres of designated EFH for Pacific Coast salmon.

3.4 Statutory Response Requirement

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

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

3.5 Supplemental Consultation

The Corps 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(1)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these

DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion is the Corps. Other interested users could include MOCC. Individual copies of this opinion were provided to the Corps and MOCC. The document will be available within two weeks at the NOAA Library Institutional Repository [<https://repository.library.noaa.gov/welcome>]. The format and naming adheres to conventional standards for style.

Integrity

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

Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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