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

Refer to NMFS No.:
WCRO-2023-02507

May 2, 2024

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

Re: Reinitiation of Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the NW Natural PGM Remedy Construction on the Willamette River at RM 12.1 to RM 12.3 (HUC 1709001202), Multnomah County, Oregon (Corps No.: NWP-2009-20-5)

Dear Mr. Abadie:

Thank you for your letter of October 11, 2023, requesting reinitiation 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.) on the effects of authorizing the NW Natural PGM Remedy Construction based on the Corps' authority under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act. 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. Actions covered in this opinion are modified from those analyzed in the biological opinion issued on May 28, 2019 (WCRO-2019-00008), as summarized in the consultation history section of the opinion. The modification to the proposed action triggers the need to reinitiate per 50 CFR 402.16(a).

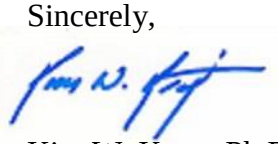
In this opinion, NMFS concludes that the revised proposed action is not likely to jeopardize the continued existence of Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, LCR coho salmon (*O. kisutch*), LCR steelhead (*O. mykiss*), or 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.

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 three conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Two of these conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. 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 Kailee McKinney in the Willamette Branch of the Oregon Washington Coastal Office, at 503-872-2854 or kailee.mckinney@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,



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

cc: Trey Fraley (Corps)
Robert Wyatt (NW Natural)
Elizabeth Greene (Anchor QEA)

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

NW Natural PGM Remedy Construction on the Willamette River at RM 12.1 to RM 12.3 (HUC 1709001202), Multnomah County, Oregon
(Corps No.: NWP-2009-20-5)

NMFS Consultation Number: WCRO-2023-02507

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 (*Oncorhynchus tshawytscha*)	Threatened	Yes	No	Yes	No
Upper Willamette River Chinook Salmon (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Lower Columbia River Coho Salmon (*O. kisutch*)	Threatened	Yes	No	Yes	No
Lower Columbia River Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Upper Willamette River Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

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

Date: May 2, 2024

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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.), as amended, and implementing regulations at 50 CFR 402.

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

1.2. Consultation History

The NMFS attended multi-agency pre-application meetings for this project on March 17, 2016 and May 24, 2018, where feedback on project design elements was provided. We received a letter from the U.S Army Corps of Engineers (Corps) on February 6, 2019, requesting initiation of formal ESA consultation on the effects of authorizing NW Natural to remediate contaminated sediments at the former Portland Gas Manufacturing (PGM) site, based on their authority under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act. The work will take place between Willamette River miles 12.1 and 12.3 on the west side of the Willamette River, in Multnomah County, Oregon. Along with the letter from the Corps, we received a biological assessment, and project maps and drawings. We requested additional information, including details on how the moonpool containment system will exclude fish and regarding the rock armor to be used on the cap, as well as a copy of EPA's review comments on the project on February 20, 2019. We received the additional information we requested on March 1, 2019, March 8, 2019, and April 29, 2019. Consultation was initiated on April 29, 2019. A biological opinion was issued on May 28, 2019, with tracking number WCRO-2019-00008.

On October 11, 2023, the Corps requested reinitiation of the existing biological opinion for proposed additional monitoring and capping activities that were not previously considered. A new Biological Assessment (BA) was provided which included the proposed additional actions to be considered in addition to the original BA. 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.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

1.3. Proposed Federal Action

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

NW Natural applied for a Corps permit to remediate contaminated sediments at the former PGM site, located on the Willamette River in Portland, Oregon, which has been completed. The work site is approximately 2.4 acres of riverbed adjacent to the City of Portland seawall along the west bank of the Willamette River on a 0.2-mile reach from river mile (RM) 12.1 to RM 12.3. Contaminants at the site included polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene (BTEX), free cyanide, and metals (lead, mercury, and zinc).

The remedial construction work occurred between July 13, 2020 and October 13, 2020. Construction activities included debris removal, contaminated sediment dredging, and placement of caps, covers, and protective armor, which is described in detail in the Environmental Baseline section of this Biological Opinion. Physical and chemical monitoring activities occurred in Year 0, immediately following construction (2020), and more recently in Year 2 (2022), and future monitoring events are scheduled to occur in Year 5 (2025) and Year 10 (2030) post-remediation. DEQ is requiring additional bathymetric surveys prior to the scheduled year 5 event (2025) due to some movement of placed cover materials observed at the site, as well as potential cap disturbance from the docking and undocking of U.S. Navy vessels during the Rose Festival Fleet Week. For this reason, reinitiation of consultation WCRO-2019-00008 was requested to include the following additional proposed actions:

- Continuation of long-term monitoring activities to monitor the effectiveness of the sediment remedy include bathymetry surveys; surface sediment grab samples; diver-assisted surface sediment samples; and TZW, PW, and SW samples. Sediment sampling for long-term monitoring activities will be scheduled at any time of the year.
- An additional bathymetric survey prior to the scheduled 5-year event in 2025 will be conducted in 2024 soon after permits are received. If significant new areas of cover erosion are identified, additional monitoring may occur to determine if contingency response actions are warranted.
- If long-term monitoring activities in 2024 or 2025 indicate that contingency response actions are warranted, contingency material placement activities would include cap and cover repair and/or augmentation as needed, with material placement up to 1,970 cubic yards. Work would occur as follows:
    - Stockpiles of clean imported sand and, if needed armor stone or supersacks of GAC would be maintained at an off-site upland staging area that had been previously disturbed such that no new effects would be generated by use of the staging area.
    - Materials would be loaded onto deck barges with an excavator or crane and a tugboat would tow the material barges to the PGM site and position them for placement using a clamshell bucket or long-reach excavator.
    - The operator would load the bucket with appropriate material and make a short sweep with the bucket while it is partially open to distribute the materials evenly on the riverbed with minimal disturbance.
    - The operator would place the sand, GAC-amended sand, and armor layers to the specified extents, thicknesses, and elevations, tracking the progress of the capping operations using precision location control software (e.g., Dredgepack), bathymetric progress and final surveys, and material placement quantities.

The applicant has proposed the following conservation measures and best management practices (BMPs) to minimize the effects of the proposed action. NMFS considers these measures to be part of the proposed action and, for purposes of our effects analysis and subsequent determination of the amount or extent of anticipated take, we assume that they are not discretionary and will be applied, in relevant part, to all work carried out under this opinion:

General Best Management Practices for Construction:

- In-water contingency action work would occur during the Oregon Department of Fish and Wildlife (ODFW) approved in-water work window for the Lower Willamette River (July 1 to October 31). Bathymetry surveys and sediment TZW, PW and SW sampling for long-term monitoring purposes could occur at any time of year because monitoring actions are expected to be minimally disruptive to the environment.
- Contingency maintenance actions will comply with water quality monitoring requirements based on Clean Water Act Section 401 Water Quality Certification (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 Work Site. Responses may include, but are not limited to, slowing work, stopping work, or providing more intensive monitoring.

- Prior to 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.
- No placement materials would be stored where materials could easily enter surface waters.
- The contractor will be responsible for the preparation of a Spill Prevention, Control, and Countermeasure (SPCC) Plan to be used for the duration of the project. The SPCC Plan will submitted for approval by the project engineer prior to the commencement of any construction activities.
- A copy of the SPCC Plan and any updates will be maintained at the Work Site by the contractor and will include the following:
    - The SPCC Plan will identify project construction elements and recognize potential spill sources at the site. The SPCC Plan will outline responsive actions in the event of a spill or release and will describe notification and reporting procedures. The SPCC Plan will outline contractor management elements such as personnel responsibilities, Work Site security, site inspections, and training.
    - The SPCC Plan will outline what measures will 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 will maintain at the job site the appliciable equipment and materials designated in the SPCC Plan.

Placement of Caps, Covers, or Armor Stone:

- Cap and cover material sources will be appropriately characterized for physical and chemical suitability for placement at the Work Site.
- Volume, tonnage and bathymetric progress surveys will be used to confirm adequate coverage and thickness has been achieved during and after material placement.
- The imported materials would be staged at an off-site upland location and transported by barge to the Work Site
- Cap, cover, and armor material will be placed with a short sweep of the bucket while it is partially opened to distribute materials evenly on the riverbed and minimize disturbance of the riverbed.
- If turbidity exceedances occur during material placement, enhanced BMPs may be implemented as follows:
    - Operational BMPs may include, but are not limited to:
        - Slowing of placement activities until turbidity exceedances are no longer detected outside of the compliance boundary
        - Submerging the bucket closer to the riverbed before releasing the cap/cover materials
        - Avoiding placement during periods of peak current velocities

- Additional engineering controls may be implemented as necessary, such as silt curtain containment
- Monitoring would continue following the implementation of enhanced BMPs until turbidity measurements return to acceptable levels.

These additional activities were not previous analyzed in the 2019 Opinion and may result in increased take of ESA species. Therefore, this information is added to the effects analysis later in this document and is considered in the revised take statement.

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 provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

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

This biological opinion also relies on the regulatory 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 designations of critical habitat for LCR Chinook salmon, UWR Chinook salmon, LCR coho salmon, LCR steelhead, and UWR steelhead use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the 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 ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision 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 critical 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" for the jeopardy analysis. 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 are essential for the conservation of the species.

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 impacts on species and ecosystems (Doney et al. 2012). These conditions will possibly intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.1 Status of the 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	NMFS 2022a; Ford 2022	This ESU comprises 32 independent populations. Relative to baseline VSP levels identified in the recovery plan (Dornbusch 2013), there has been an overall improvement in the status of a number of fall-run populations although most are still far from the recovery plan goals; Spring-run Chinook salmon populations in this ESU are generally unchanged; most of the populations are at a "high" or "very high" risk due to low abundances and the high proportion of hatchery-origin fish spawning naturally. Many of the populations in this ESU remain at "high risk," with low natural-origin abundance levels. Overall, we conclude that the viability of the Lower Columbia River Chinook salmon ESU has increased somewhat since 2016, although the ESU remains at "moderate" risk of extinction	• Reduced access to spawning and rearing habitat • Hatchery-related effects • Harvest-related effects on fall Chinook salmon • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Contaminant
Upper Willamette River Chinook salmon	Threatened 6/28/05	NMFS 2011	NMFS 2016; Ford 2022	This ESU comprises seven populations. Abundance levels for all but Clackamas River DIP remain well below their recovery goals. Overall, there has likely been a declining trend in the viability of the Upper Willamette River Chinook salmon ESU since the last review. The magnitude of this change is not sufficient to suggest a change in risk category, however, so the Upper Willamette River Chinook salmon ESU remains at "moderate" risk of extinction.	• Degraded freshwater habitat • Degraded water quality • Increased disease incidence • Altered stream flows • Reduced access to spawning and rearing habitats • Altered food web due to reduced inputs of microdetritus • Predation by native and non-native species, including hatchery fish • Competition related to introduced salmon and steelhead • Altered population traits due to fisheries and bycatch

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	NMFS 2022a; Ford 2022	Of the 24 populations that make up this ESUOnly six of the 23 populations for which we have data appear to be above their recovery goals. Overall abundance trends for the Lower Columbia River coho salmon ESU are generally negative. Natural spawner and total abundances have decreased in almost all DIPs, and Coastal and Gorge MPG populations are all at low levels, with significant numbers of hatchery-origin coho salmon on the spawning grounds. Improvements in spatial structure and diversity have been slight, and overshadowed by declines in abundance and productivity. For individual populations, the risk of extinction spans the full range, from "low" to "very high." Overall, the Lower Columbia River coho salmon ESU remains at "moderate" risk, and viability is largely unchanged since 2016.	• Degraded estuarine and near-shore marine habitat • Fish passage barriers • Degraded freshwater habitat: Hatchery-related effects • Harvest-related effects • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants
Lower Columbia River steelhead	Threatened 1/5/06	NMFS 2013	NMFS 2022a; Ford 2022	This DPS comprises 23 historical populations, 17 winter-run populations and 6 summer-run populations. 10 are nominally at or above the goals set in the recovery plan (Dornbusch 2013); however, it should be noted that many of these abundance estimates do not distinguish between natural- and hatchery- origin spawners. The majority of winter-run steelhead DIPs in this DPS continue to persist at low abundance levels (hundreds of fish), with the exception of the Clackamas and Sandy River DIPs, which have abundances in the low 1,000s. Although the five-year geometric abundance means are near recovery plan goals for many populations, the recent trends are negative. Overall, the Lower Columbia River steelhead DPS is therefore considered to be at "moderate" risk.	• Degraded estuarine and nearshore marine habitat • Degraded freshwater habitat • Reduced access to spawning and rearing habitat • Avian and marine mammal predation • Hatchery-related effects • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants

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 2011	NMFS 2016; Ford 2022	This DPS has four demographically independent populations. Populations in this DPS have experienced long-term declines in spawner abundance. Although the recent magnitude of these declines is relatively moderate, continued declines would be a cause for concern. In the absence of substantial changes in accessibility to high-quality habitat, the DPS will remain at "moderate-to-high" risk. Overall, the Upper Willamette River steelhead DPS is therefore at "moderate-to-high" risk, with a declining viability trend.	• Degraded freshwater habitat • Degraded water quality • Increased disease incidence • Altered stream flows • Reduced access to spawning and rearing habitats due to impaired passage at dams • Altered food web due to changes in inputs of microdetritus • Predation by native and non-native species, including hatchery fish and pinnipeds • Competition related to introduced salmon and steelhead • Altered population traits due to interbreeding with hatchery origin fish

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). For this consultation, the action area is the Willamette River between river miles 12.1 and 12.3 adjacent to the City of Portland seawall at downtown Portland's Tom McCall Waterfront Park where debris removal, dredging and cap construction will occur, and includes all river areas within 500 feet of the work area to account for the worst-case extent of turbidity impacts during debris removal, dredging, and cap construction.

Five ESA-listed species use the action area for adult migration, juvenile rearing, and juvenile 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.

NMFS has engaged in various Section 7 consultations on Federal projects impacting these populations and their habitats in the action area, and those impacts 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 Gunderson Barge Launchway and Outfitting Dock Repairs (WCR-2017-8565), the Shell Oil Portland Bulk Terminal Removal (WCR-2017-6906), the University of Portland Habitat Restoration and Dock Construction (WCR-2017-6909), the Kinder Morgan Soil Remediation (WCR-2018-10200), the Linnton Water Credits, LLC Habitat Restoration and Mitigation Bank (WCR-2017-6525), 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 PGE Harborton Restoration (WCR-2018-10175), the Ash Grove Cement Company Maintenance Dredging (WCR-2018-10198), the TLP Management Services Maintenance Dredging (WCR-2018-9312), the Vigor Shipyard Dredging (NWR-2013-10001), the Glacier Northwest Dredging (WCR-2015-2734), and the Port of Portland's Terminal-Wide Maintenance Dredging (NWR-2012-3169).

These projects had temporary negative effects on local baseline conditions, but no significant long-term adverse effects outside of the fact that the maintenance and repair of dock structures will have the effect of allowing them to continue to exist for longer than would otherwise be the case. This will perpetuate the existing adverse effects of the structures (e.g. increased shading, reduction in prey, increased predation, possible minor migration delays) farther into the future. These effects have been analyzed extensively in many previous biological opinions (e.g. NMFS 2011b, SLOPES IV In-water and Over-water Structures), and in general result in some reduced fitness and survival in a small number of individuals.

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). The Federal Navigation Channel at Post Office Bar was dredged in October 2011. In addition, 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 trying to 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 just downstream of the action area is presently being addressed under the Federal Superfund process.

The action area is characterized by degraded environmental baseline conditions as a result of historical alterations to the LWR, historical site contamination, and the presence of the City of Portland seawall. Substrate within the site has been impacted by direct and indirect

contamination of sediment and groundwater during PGM industrial operations prior to 1913, during seawall construction in the late 1920s, and by contamination from other historical industries and urban stormwater runoff.

The PGM site was a manufactured gas plant from 1860 to 1913 that occupied multiple city blocks along the waterfront and included facilities such as gas holders, oil tanks, coal storage, lampblack sheds, purifiers, scrubbers, and coal retorts. Primary waste products associated with PGM site operations would have included oil, tar, and purifier waste. Excavation and fill was required during seawall construction, and dredging for the seawall foundation trench caused several waterfront structures to collapse into the river.

The elevation of the riverbed in the proposed action area ranged from approximately -20 feet City of Portland datum (COP) near the seawall to -40 feet COP in the main body of the river, approximately 300 feet offshore and to the east. At those depths, the contaminated sediments that were addressed in the remediation were interspersed with anthropogenic building debris (including concrete, metal, timber, and brick building remnants likely associated with former waterfront structures). The anthropogenic debris within the site was found in several offshore mounds aligned parallel to the seawall and elevated up to 10 feet above the surrounding riverbed. A surface deposit of weathered and hardened tar-like material (TLM) associated with historical PGM site operations occurred at the mudline amidst the debris piles.

Dredging and debris removal was performed first, using a moonpool containment system surrounding the dredge and extending over a majority of the water column, combined with an anchored bedload baffle curtain around the perimeter of the dredging area. The moonpool containment system was made up of a rigid, interlocking float system and an adjustable-depth, double-walled sediment containment curtain which could be raised or lowered in response to tides and river conditions. The base of the moonpool curtains were extended to approximately 2 feet above the riverbed to prevent the curtain anchors from dragging in the sediments and to provide an opening for fish to escape the containment area. The bedload baffle curtain (minimum 5 feet in height) was anchored to the river bottom around the perimeter of the dredging area to provide added containment, especially in the deeper parts of the work area where the moonpool curtain would not reach the full depth of the water column. These engineering controls were designed to contain turbidity generated during project activities and deter fish from entering the work area.

Dredging work included removal of the surficial TLM and associated high-concentration sediment, as well as removal of debris obstructions in remediation areas. Following the completion of debris removal and dredging, granular activated carbon (GAC) amended sand treatment caps and covers were placed, armored as needed to protect against propwash and erosive currents, in some areas. Sand covers for enhanced natural recovery and residuals management were placed in other areas. Armor stone had a median diameter of approximately 3 to 4 inches.

Stockpiles of clean imported sand and armor stone were maintained at an off-site upland staging area and brought to the site by barge. A small quantity of solidified TLM (approximately 200 cubic yards) was segregated as special waste and designated for off-site disposal at the Subtitle C landfill operated by Chemical Waste Management in Arlington, Oregon. All other

material removed from the site (approximately 5,372 cubic yards) was transported in a watertight barge to a transfer facility at The Dalles, Oregon, for sorting, recycling as appropriate, amendment with pulp fiber (or other drying agent) to remove free water, and off-site disposal at the Wasco County Subtitle D landfill.

The PGM remedial construction work was completed between July 13th and October 13th 2020. Physical and chemical monitoring activities occurred in year 0 immediately following construction in 2020, as well as more recently in year 2 (2022). All capped areas have been stable, however, there has been some movement of placed cover materials observed at the site, which prompted DEQ to request additional bathymetric surveys prior to the scheduled 5 year monitoring event in 2025. This prompted the reinitiation of this consultation, to analyze the effects of additional monitoring, and if the additional and long-term monitoring should indicate the need, contingency material placement to repair the previous capping.

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 to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). 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 the factors set forth in 50 CFR 402.17(a) and (b).

2.5.1 Effects on Listed Species

The proposed action will affect the salmonid species considered in this opinion by causing physical, chemical, and biological changes to the environment, and through direct effects on individual fish. These adverse effects include a temporary reduction in water quality from increased suspended sediment and associated contaminants during monitoring activities and cap maintenance, burial of prey species and alteration of benthic habitat caused by contingency material placement for cap repair, and harassment/displacement from disturbance caused by construction equipment and activities. 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 project-specific spill prevention and response plan. The beneficial effects of the proposed action will include maintaining the reduction in exposure of ESA-listed species and their prey to contaminants by ensuring cap stability.

The adverse effects of the proposed action are described in detail below.

Disturbance. The auditory, visual, and physical disturbance caused by construction equipment and activities, primarily contingency material placement for cap repairs, will affect the behavior of ESA-listed salmon and steelhead and likely lead to injury in a few cases. ESA-listed salmon and steelhead presence in the sampling and potential capping areas will also increase the risk of exposure to elevated suspended sediment and contaminants (we discuss these effects below).

Water Quality. Cap and cover repair and/or augmentation will suspend sediment in the river, temporarily increasing turbidity over ambient conditions. The effects of suspended

sediment and turbidity on fish range from beneficial to detrimental depending on duration and intensity. 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). 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). 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.

Depending on the concentrations of suspended solids, juvenile fish will either seek refuge in adjacent areas with less turbidity, or remain in the area, taking advantage of the additional cover. Death or injury to ESA-listed salmonids directly from an increase in TSS is not likely. Juvenile salmonids in the action area primarily feed visually on zooplankton feeders in the summer, so their ability to feed will decline where suspended sediments have been elevated. This likely will reduce growth, lipid stores, and ultimately fitness and survival in a small number of juvenile fish.

Given the small area of river affected, the temporary duration of the in-water work, and the small number of ESA-listed salmonids likely to be present and exposed to elevated TSS and contaminants, only a few ESA-listed fish are likely to experience the adverse TSS and contaminant effects described above, and only a subset of those will actually respond adversely to exposure.

Prey Base. The relatively calm waters near the action area during construction should allow particulates to settle out of the water column quickly, limiting disruptions to planktonic feeding in the action area to roughly 24 hours following the in-water activities. It is unlikely that the proposed action will result in measurable 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 in-water work for a short period of time, but the effects are not likely to be measurable afterwards. 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 contingency material placement will be longer. The benthic invertebrate populations within the capped areas will be absent until the new surface layer is recolonized. The effects to benthic productivity and availability of prey items in the area will last at least several months after cap repairs are completed.

Effects to the prey base are likely to have effects on juvenile salmonids rearing in the action area for a period of months following dredging and cap construction. However, sediment that will be dredged and capped is in deep water adjacent to a seawall. Therefore, the importance of the site as a rearing area for juvenile salmonids is limited, and the disturbance to the benthic community at the site will not alter feeding opportunities for salmonids in the lower river as a whole.

Habitat Alteration. Overall, the alteration of salmonid habitat due to the project will not decrease habitat value for ESA-listed salmonids. As noted above, cap repairs will take place in deep water (>20 feet) adjacent to a seawall in an urban area, and therefore the area already provides little habitat value for ESA-listed salmonids.

Ongoing sediment deposition is evident due to the sedimentation dynamics of the river in this area. The various anthropogenic debris described above is present over the surface in certain areas. Since completion of remedial construction in 2020, the river bottom cap consists of sand and granular activated carbon amended sand in some areas and gravel to cobble sized armor rock, well graded and with a median diameter of 3-4 inches, in other areas. The armor rock is expected to be covered by soft sediment (sand and silt) within a few years due to the prevailing high sedimentation rates at the site (averaging approximately 3 centimeters per year).

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 any potential cap repair activities 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 short-term stress due to interactions with construction equipment, reduced water quality, and reduced forage during and for a short time after debris removal, dredging, and cap construction. 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 effects of monitoring activities or

by a 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.

Long-term monitoring and sediment sampling may occur at any point during the year, but, given the minimally invasive nature of the such activities, the effects are expected to be negligible.

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. The adverse water quality, forage and passage effects described will be short-term (up to several months) during and immediately following in-water work.

Freshwater rearing
Floodplain connectivity – No effect.

Forage – Decreased quantity and quality of forage, due to increased suspended sediment during and for a period of months following construction until the cap surface is recolonized with benthic forage species.

Natural cover – Temporary increase in cover due to suspended sediment in the water column during cap repairs.

Water quality – Increased suspended sediment and concentrations of contaminants during and for a short period following sediment sampling activities and cap repairs. They are likely to persist for up to a few hours at most after operations have ceased for the day. There will also be a long-term small improvement in water quality due to isolation of the remaining contaminants under the repaired cap.

Water quantity – No effect.

Freshwater migration
Free of artificial obstruction – Possible delayed juvenile migration during cap repairs due to in-water operations.

Natural cover – Temporary increase in cover due to suspended sediment in the water column during sampling and cap repairs.

Water quality – Increased suspended sediment and concentrations of contaminants during and for a short period following sampling activities and cap repairs. They are likely to persist for up to a few hours at most after operations have ceased for the day. There will also be a long-term small improvement in water quality due to isolation of the remaining contaminants under the repaired cap.

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. None of the effects are likely to reduce the quality and function of the PBFs within the action area over the long term. 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(1)]. 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.

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 2.3). The collective effects of these activities tend to be expressed most strongly in lower river systems where the impacts 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 2.3 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). 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 and thus will not be the subject of a section 7 consultation. These future actions will likely lead

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

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.

2.7. Integration and Synthesis

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

2.7.1 ESA Listed 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 those impacts 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 impacts; 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 increases in suspended sediment and contaminants during in-water work. The reduction in water quality will be short term (up to several months) during sediment sampling and cap repairs. Other effects of the proposed action include possible disturbance or injury to fish from interactions with construction equipment, a temporary reduction in prey availability due to burial under the contingency material placement, and a long-term reduction in exposure of ESA-listed salmonids and their prey to contaminants due to burial under the repaired cap. Because the adverse effects are relatively brief and 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 measurable 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.

2.7.2 Critical Habitat

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 cap repairs and for a period of time afterwards due to suspended sediment and associated contaminants, burial of prey items, and operation of construction equipment in the action area (water quality, forage, and free passage effects to freshwater rearing sites and freshwater migration corridors). Over the long-term, water and sediment quality will improve in the action area due to isolation of contaminants beneath the cap.

The effects of this action will not 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 in the preceding paragraphs of this section, 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 critical habitat, the environmental baseline within the action area, the effects of 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 to destroy or adversely modify critical habitat designated for these species.

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). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "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 to juveniles of all ESA-listed salmon and steelhead considered in this opinion due to impaired feeding, resting, and refuge from predators related avoiding construction equipment during long-term monitoring and cap repairs.
- Harm to juveniles of all ESA-listed salmon and steelhead considered in this opinion due to temporary removal of access to forage species related to the burial of benthic substrate during contingency material placement.
- Harm to juveniles and adults of all ESA-listed salmon and steelhead considered in this opinion due to a temporary increase in exposure to contaminants in water, sediment, and prey during sediment sampling and cap repairs.

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 avoiding construction equipment and removal of access to forage species: the size of the area where contingency materials will be placed and sediment sampling will occur. Specifically, the anticipated take will be exceeded if sediment sampling occurs outside of the 2.4-acre project area and if contingency material placement exceeds 0.64 acres in size;
(2) For harm associated with an increase in suspended sediments and associated contaminants: the extent of suspended sediment plumes. Specifically, the anticipated take will be exceeded if increased suspended sediment from sediment sampling or cap repairs causes suspended sediment plumes 300 feet from the boundary of construction activities to exceed 5 NTU over the background level for two consecutive monitoring intervals.

These take indicators act as effective reinitiation triggers because the Corps has authority to conduct compliance inspections and to take actions to address non-compliance (33 CFR 326.4). Moreover, 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 area where contingency material may be placed is directly correlated to the area over which harm due to avoiding construction equipment is likely to occur as well as the area over which benthic forage species will be buried, and thus the number of individuals harmed or killed, as well as the level of impacts to species (the more

substrate is buried under the cap, 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 sediment sampling and cap repairs because larger sediment plumes are correlated with harm to a larger number of individual fish.

Exceeding any 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 when the reasonable and prudent alternative is implemented.

2.9.3 Reasonable and Prudent Measures

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

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

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

1. The following term and condition implements 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. Long-term monitoring activities may occur at any time because this work is expected to be minimally disruptive to the environment.

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. 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 upcurrent 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 downcurrent.

   ii. Compliance point. Monitoring must occur every 2 hours approximately 300 feet downcurrent 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. Exceedance. If an exceedance occurs, the applicant must modify the activity and continue to monitor every 2 hours. If an exceedance 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.

f. Contaminant Containment. The applicant must maintain an absorptive boom during all in-water activities to capture contaminants that may be floating on the water surface as a consequence of construction activities.

2. The following term and condition implements reasonable and prudent measure 2:

   a. Reporting. The applicant must report all monitoring items within 60 days of the close of any work window that had in-water work within it, including:

      i. A discussion of implementation of the terms and conditions in #1, above.

      ii. Turbidity observations.

      iii. The area dredged and covered by the cap.

      iv. Dates of initiation and completion of in-water work.

v. The applicant must report any exceedance of take covered by this opinion to NMFS immediately.

b. The applicant must submit monitoring reports to:

projectreports.wcr@noaa.gov
Attn: WCRO-2023-02507

2.10. Conservation Recommendations

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

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 NW Natural PGM Remedy Construction.

As 50 CFR 402.16(a): “Reinitiation of formal 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: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If 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) If 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 written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action.

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

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

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific coast salmon (Pacific Fishery Management Council (PFMC 2022) 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 (Pacific Fishery Management Council 2022).

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 proposed action will have adverse effects on EFH designated for Chinook and coho salmon. These effects include a temporary reduction in water quality from increased suspended sediment and associated contaminants during sediment sampling and cap repairs, as well as a short-term loss of benthic invertebrates and harassment/displacement due to contingency material placement.

3.3. Essential Fish Habitat Conservation Recommendations

1. In-water Work: The Corps should recommend that the applicant follow terms and conditions 1(c) – 1(f) as presented in the ESA portion of this document.
2. Monitoring and Reporting: The Corps should recommend that the applicant follow terms and conditions 2(a) and 2(b) as presented in the ESA portion of this document.
3. The Corps should recommend that the applicant 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

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, approximately 3 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(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the Corps. Other interested users could include NW Natural, citizens of the affected area, and others interested in the conservation of the affected ESUs/DPS. Individual copies of this opinion were provided to the Corps and NW Natural. The document will be available at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

4.2. Integrity

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

4.3. Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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