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

Refer to NMFS Consultation No.:
WCRO-2018-00128

August 2, 2019

Michelle Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Seattle District
Regulatory Branch CENSW-OD-RG
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Port of Anacortes Piling Repair and Replacement Project, Anacortes, Washington (Corps No. NWS-2018-468)

Dear Ms. Walker:

Thank you for your letter on October 26, 2018, requesting initiation of consultation with the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 USC 1531 et seq.) for the proposed Port of Anacortes Piling Repair and Replacement Project in Anacortes, Washington. 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 USC 1855(b)) for this action.

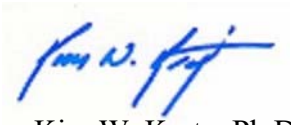
The enclosed document contains the biological opinion (Opinion) prepared by NMFS pursuant to section 7(a)(2) of the ESA on the effects of the proposed action. In this Opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon, PS steelhead, Puget Sound/Georgia Basin (PS/GB) bocaccio, PS/GB yelloweye rockfish, Southern Resident killer whales (SRKW), and humpback whales. NMFS also concludes that the proposed action is not likely to result in the destruction or adverse modification of designated critical habitat for PS Chinook salmon and PS/GB bocaccio.

As required by section 7 of the ESA, we are providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures we consider necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the United States Army Corps of Engineers (Corps) and any person who performs the action 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 take prohibition.

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

Please contact Melaina Wright, consulting biologist at the Oregon Washington Coastal Office (OWCO) at melaina.wright@noaa.gov or 206-526-6155 if you have any questions concerning this consultation, or if you require additional information.

Sincerely,



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

cc: Juliana Houghton, Corps
Ronald Wilcox, Corps

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

Port of Anacortes Piling Repair Project
Skagit County, Washington
(Corps No. NWS-2018-468)

NMFS Consultation Number: WCRO-2018-00128

Action Agency: United States Army Corps of Engineers, Seattle District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*)	Threatened	Yes	No	Yes	No
Puget Sound steelhead (*O. mykiss*)	Threatened	Yes	No	NA	NA
Puget Sound/ Georgia Basin yelloweye rockfish (*Sebastes ruberrimus*)	Threatened	Yes	No	NA	NA
Puget Sound/ Georgia Basin bocaccio (*S. paucispinis*)	Endangered	Yes	No	Yes	No
Southern Resident killer whale (*Orcinus orca*)	Endangered	No	No	No	No
Humpback whale Mexico DPS (*Megaptera novaeanglia*)	Threatened	No	No	NA	NA
Humpback whale Central America DPS (*M. novaeanglia*)	Endangered	No	No	NA	NA

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

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

Issued By:

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

Date: August 2, 2019

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LIST OF ACRONYMS

ºC – Degrees Celsius
ºF – Degrees Fahrenheit
ACZA – Ammoniacal Copper Zinc Arsenate
BD – Behavioral Disturbance
BMP – Best Management Practice
CFR – Code of Federal Regulations
Corps – United States Army Corps of Engineers
dB – Decibels
DIP – Demographically Independent Population
DO – Dissolved Oxygen
DPS – Distinct Population Segment
DQA – Data Quality Act
Ecology – Washington State Department of Ecology
EF – Essential Features
EFH – Essential Fish Habitat
ESA – Endangered Species Act
ESU – Evolutionarily Significant Unit
FR – Federal Register
HAPC – Habitat Area of Particular Concern
HPA – Hydraulic Project Approval
Hz - Hertz
IPCC – Intergovernmental Panel on Climate Change
ISAB – Independent Scientific Advisory Board
ITS – Incidental Take Statement
kHz - Kilohertz
MFS – Memorandum for the Services
mg/L – Milligrams per Liter
MHHW – Mean Higher High Water Line
MLLW – Mean Lower Low Water Line
MPG – Major Population Group
MSA – Magnuson-Stevens Fishery Conservation and Management Act
NLAA – Not Likely to Adversely Affect
NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration
NTU – Nephelometric Turbidity Unit
NWFSC – Northwest Fisheries Science Center
OHW – Ordinary High Water Line
Opinion – Biological Opinion
OWCO – Oregon Washington Coastal Office
PAH – Polycyclic Aromatic Hydrocarbon
PBF – Physical and Biological Feature
PCB – Polychlorinated Biphenyl
PFMC – Pacific Fishery Management Council
PCE – Primary Constituent Element

Ppt – Parts Per Thousand
PS – Puget Sound
PS/GB – Puget Sound/Georgia Basin
PTS – Permanent Threshold Shift
RMS – Root Mean Square Sound Pressure Level
ROV – Remotely Operated Underwater Vehicle
RPA – Reasonable and Prudent Alternative
RPM – Reasonable and Prudent Measure
SAV – Submerged Aquatic Vegetation
SEL – Sound Exposure Level
SEL_{cum} – Cumulative Sound Exposure Level
SMS – Sediment Management Standards
SPCC – Spill Prevention, Control, and Countermeasure Plan
SPIF – Specific Project Information Form
SRKW – Southern Resident Killer Whale
SSDC – Shared Strategy Development Committee
TRT – Technical Recovery Team
TSS – Total Suspended Solids
TTS – Temporary Threshold Shift
µg/L – Micrograms Per Liter
USC – United States Code
VSP – Viable Salmon Population
WAC – Washington Administrative Code
WCR – West Coast Region
WDFW – Washington State Department of Fish and Wildlife
WSDOT – Washington State Department of Transportation

1. INTRODUCTION

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

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (Opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402. 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 USC 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at the Oregon Washington Coastal Office.

1.2. Consultation History

On September 14, 2018, NMFS received a request to initiate ESA section 7 consultation from the United States Army Corps of Engineers (Corps). The initiation package included an ESA section 7 consultation initiation letter; a Memorandum for the Services (MFS); a completed Corps specific project information form (SPIF); a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife (WDFW); photographs of the site; and a set of project drawings. The Corps determined the action may affect but is not likely to adversely affect (NLAA) Puget Sound (PS) Chinook salmon and their critical habitat, PS steelhead, Puget Sound/Georgia Basin (PS/GB) bocaccio rockfish and their critical habitat, PS/GB yelloweye rockfish and their critical habitat, and Southern Resident killer whales (SRKW) and their critical habitat. The Corps also determined that the project will not adversely affect EFH.

On October 17, 2018, we informed the Corps that we could not concur with all of their effects determinations. On October 26, 2018, the Corps requested formal consultation with NMFS and provided additional information confirming that existing piles at the site are comprised of creosote-treated timber. Consultation was initiated on that date.

1.3. Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910). "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

The Corps is proposing to authorize the Port of Anacortes Piling Repair and Replacement Project in the Guemes Channel located at 100 Commercial Avenue, Anacortes, Washington (48.52167, -122.61278; Figure 1, Figure 2, and Figure 3) under section 10 of the Rivers and Harbors Act section 404 of the Clean Water Act. The project site is at Port of Anacortes Pier 1 and includes about 30,810 square feet of opaque creosote and ACZA treated decking over marine substrate between +10 MHHW and -22 feet MLLW (Figure 4). The primary use of Pier 1 is to support Dakota Creek Industries, Inc. and house Port offices and maintenance facilities (Anacortes 2017). Dakota Creek Industries, Inc. constructs new vessels and repairs existing vessels such as tug boats, ferries, fishing vessels, military vessels, and research vessels ranging from 90 feet to 330 feet in length (Dakota Creek Industries Inc. 2018).

Existing piles at Pier 1 are 12-inch diameter creosote-treated timber. The applicant will repair and replace up to 46 damaged structural piles and replace up to 9 fender piles (Figure 4). They will also repair and replace damaged sections of pile cap. All replacement piles will be 12-inch diameter ammoniacal copper zinc arsenate (ACZA) treated timber that complies with the Western Wood Preserves Institute best management practices (BMPs). All work will be conducted between July 16 and February 15.

For each deteriorated pile under the main Port office building, the applicant will hand excavate the area around the pile bases and cut the existing piles 2 feet below the mudline. They will install a new pile extension on top of the pile stub and attach it to the existing pile cap. They will install a steel drum or fiberglass sleeve around the pile extension and pile stub that will extend below the mudline to about +2 feet elevation. They will fill the drum or sleeve with concrete during the outgoing tide. They will replace excavated sediments by hand around the base of the pile. For each deteriorated pile not located under the building, the applicant will remove and replace the pile with a new pile in approximately the same location under the existing pile cap. They will cut removed creosote-treated pile sections into lengths 4-foot or less and dispose of them at an approved upland disposal site. They will not stockpile or stage material below the ordinary high water line (OHW) or mean higher high water line (MHHW). They will place two oil absorbing floating booms whenever heavy equipment operations are within 150 feet of surface water.

The applicant will install the piles using both vibratory and impact hammers. They will remove small areas of timber pier deck to allow for pile driving and replace removed decking with AZCA-treated wood after pile driving is completed. Repaired piles will be installed in water depths of +10 to 0 feet. Driven piles will be installed in 0 to -22 feet water depth. Pile driving will only occur during daylight hours and will not use construction lights. Vibratory pile driving will occur up to 90 minutes a day for up to 12 days. Given the substrate, proofing of piles will require up to 250 strikes per pile. Impact pile driving will require up to 300 pile strikes per pile and up to 2,000 pile strikes a day. Impact pile driving will occur up to 90 minutes a day for up to 12 days. To minimize impacts to marine mammals, a marine mammal buffer area will be monitored immediately before and during pile driving activity. Pile driving will not be initiated, or will be temporarily suspended, if an ESA-listed marine mammal is within a 400-foot radius of the work site. No piles will be installed where eelgrass currently exists. Piles within 25 feet of existing eelgrass will be installed from the far side of the pier or at high tide. They will also ensure that barges or other structures will not ground out on the bottom.

The applicant commits to implementing the project and associated conservation measures identified in the Specific Project Information Form (SPIF) and WDFW HPA (Port of Anacortes email 2018). Additionally, the applicant has agreed to the following (Port of Anacortes email 2018):

1. Install a full-depth silt curtain around pile extraction.
2. Limit vibratory pile removal to vibratory extraction and/or simple pull techniques (no water jetting, no clamshell excavation).
3. Require their contractors and tugboat operators to adjust work practices to ensure that turbidity does not exceed 300 feet from the project site, and to halt work should the visible turbidity plume approach that range in order to reduce exposure to contaminated forage.
4. Utilize vibratory installation to the maximum extent practicable, and to minimize the use of impact proofing to reduce noise impacts to listed species.
5. If practicable at the site, install a bubble curtain (preferably enclosed) and ensure it is operating properly prior to initiating any impact proofing to minimize noise impacts to listed species.

The proposed action will cause no new activities nor prevent any ongoing activities at or near the project site. Therefore, no interrelated or interdependent activities are expected to occur. However, the proposed action will prolong the presence of the overwater structure into the foreseeable future as the piles at Pier 1 do not provide adequate structural support in their current form (Figure 5).

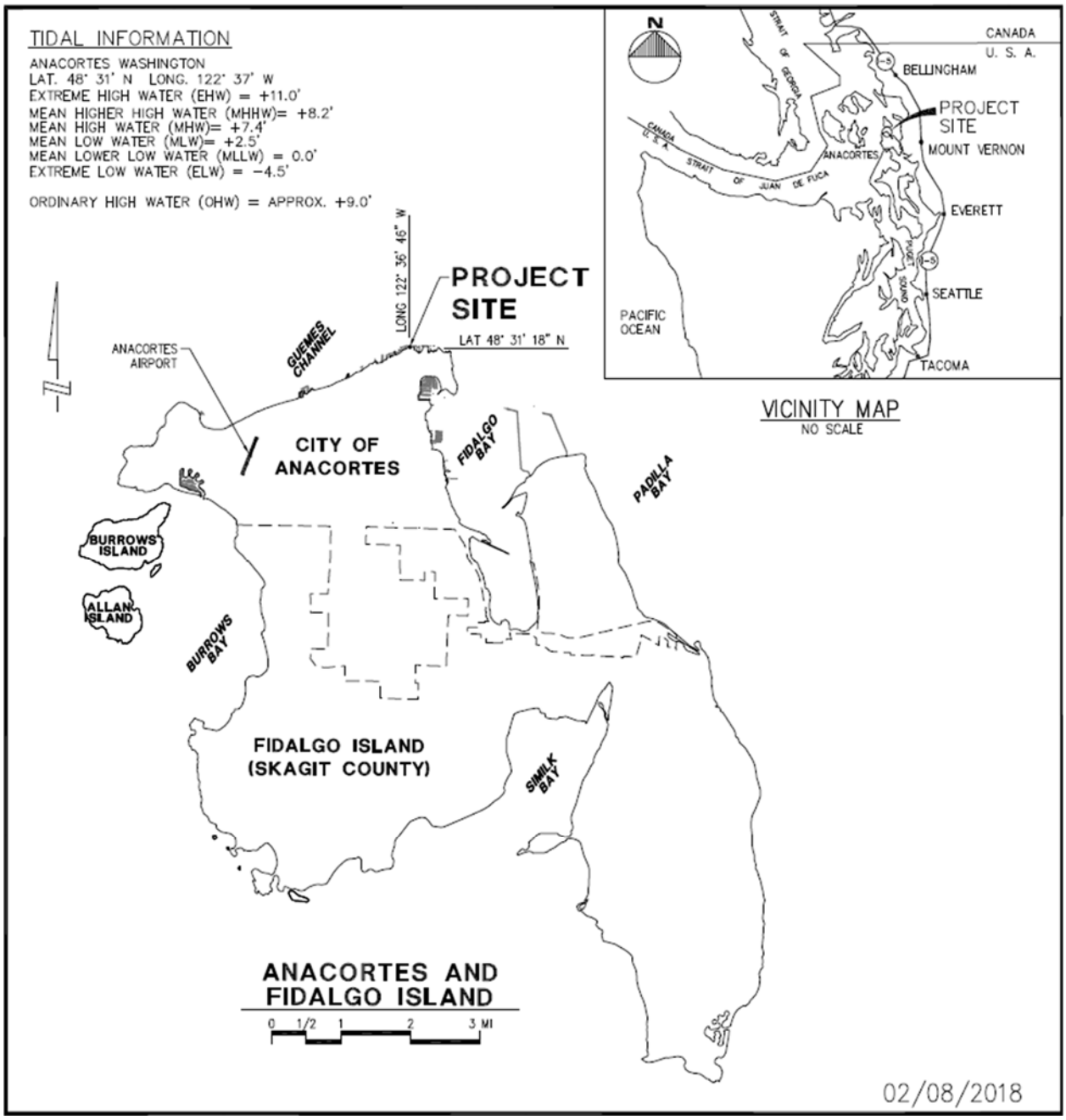

Figure 1. Project site location in Anacortes, Washington.

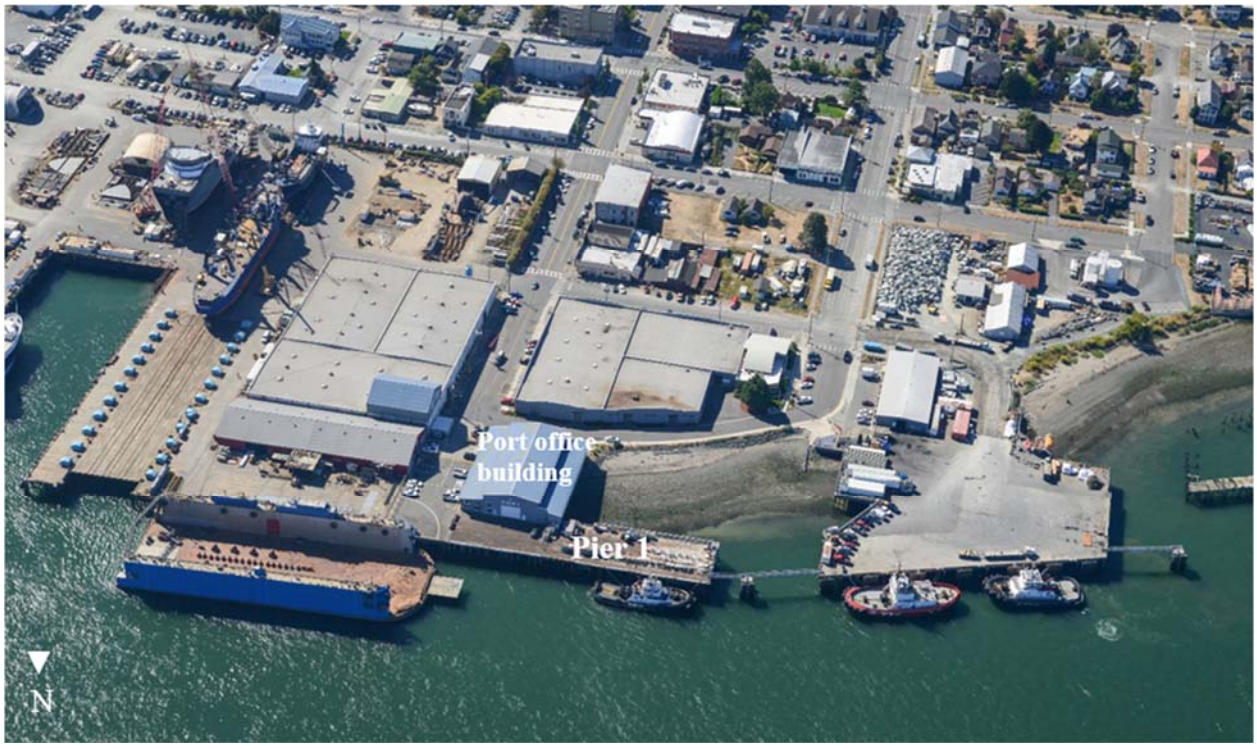

Figure 2. Aerial view of project site and vicinity.

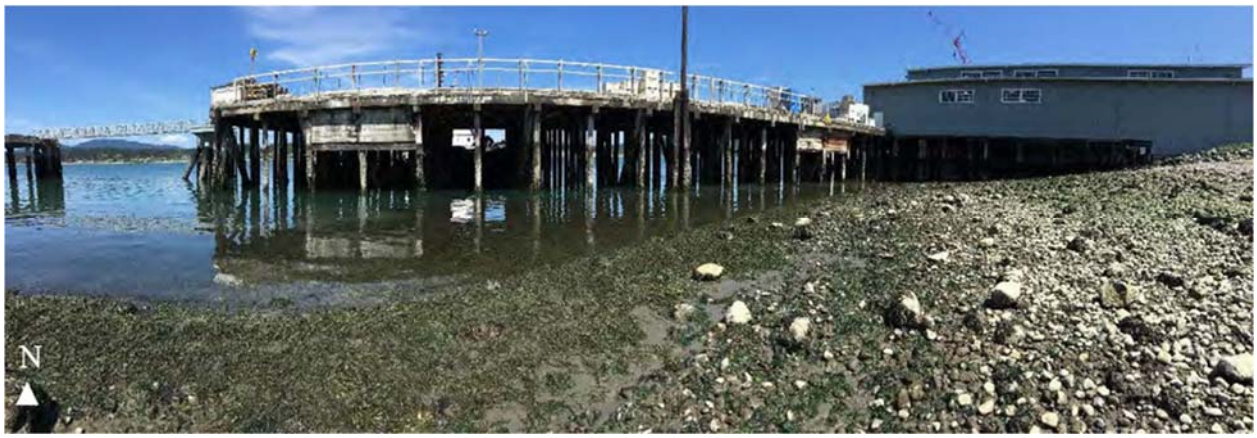

Figure 3. Panoramic view of Pier 1, main Port office building, and marine vegetation at low tide.

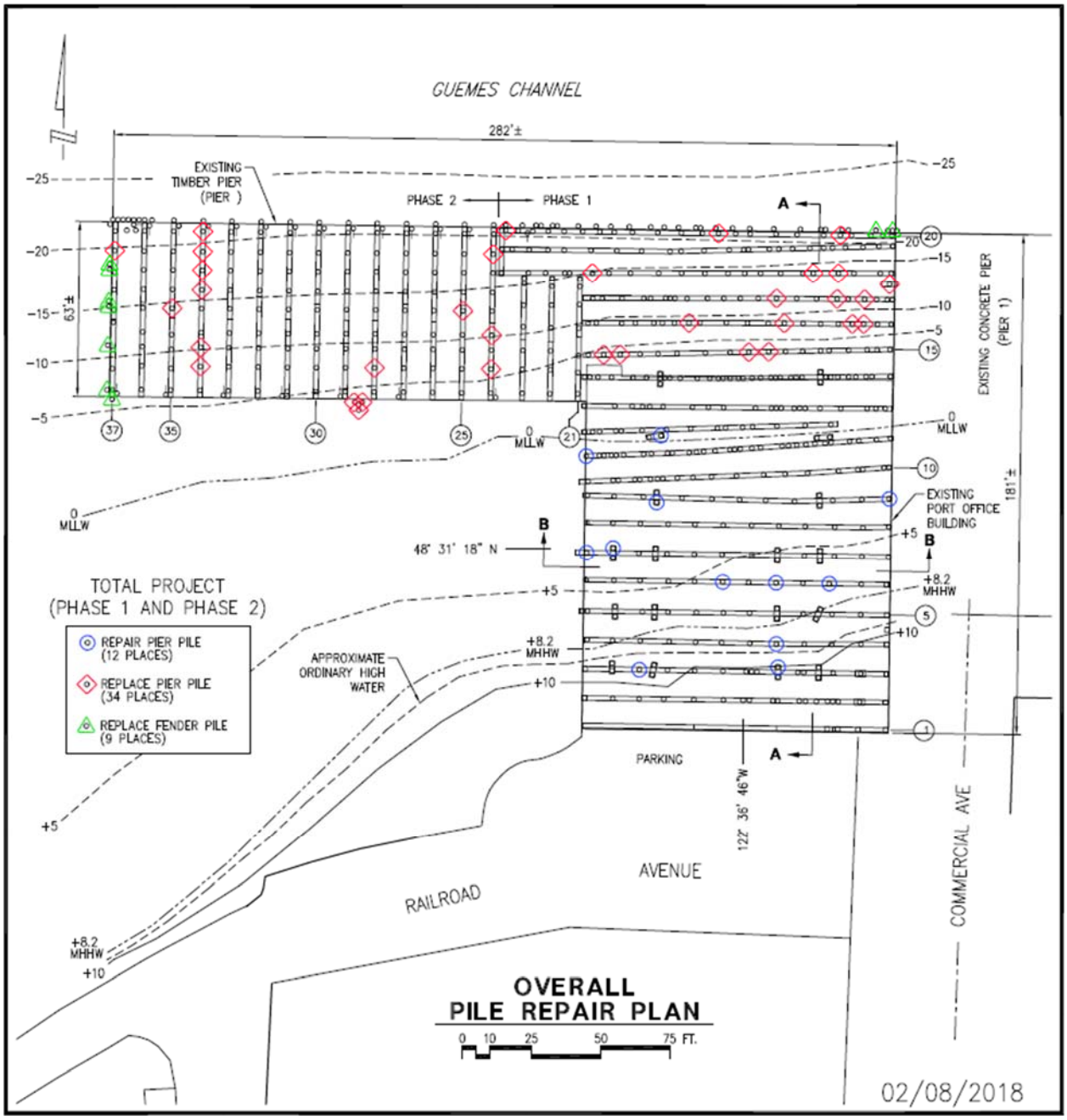

Figure 4. Location of piles proposed to be repaired and replaced, and the size and configuration of the applicant's structure.

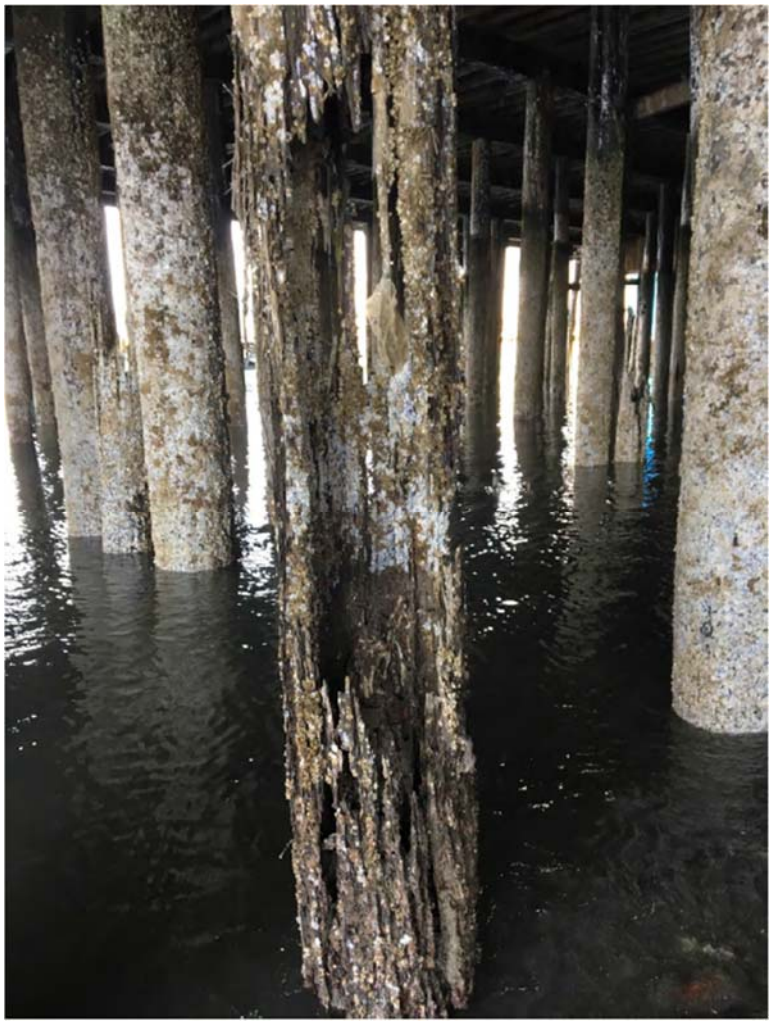

Figure 5. One of the damaged piles under the main Port office building.

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.

The Corps determined the proposed action is not likely to adversely affect humpback whales, and SRKW and their critical habitat. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (Section 2.12).

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of “to jeopardize the continued existence of” a listed species, which is “to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which “means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features” (81 FR 7214).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ‘‘destruction or adverse modification’’ analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

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

2.2. Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The Opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

2.2.1. Climate Change

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

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°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 percent by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2013; 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 (Isaak et al. 2012; Mantua et al. 2010). 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; Raymondi et al. 2013; Winder and Schindler 2004). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Raymondi et al. 2013; Wainwright and Weitkamp 2013).

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

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

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. 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 to 32 inches by 2081 to 2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Reeder et al. 2013; Tillmann and Siemann 2011). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007).

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

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these evolutionarily significant units (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.

2.2.2. Status of the Species

This section provides a summary of listing and recovery plan information, status, 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/).

PS Chinook salmon

We listed the PS Chinook salmon ESU as threatened on June 28, 2005 (70 FR 37160). Recovery plans for PS Chinook salmon include the Shared Strategy for Puget Sound 2007 Plan and the NMFS 2006 Plan (NMFS 2006; SSDC 2007). The most recent status review was in 2015 (NWFSC 2015). This ESU comprises 22 populations distributed over five geographic areas. Most populations within the ESU have declined in abundance over the past 7 to 10 years, with widespread negative trends in natural-origin spawner abundance and hatchery-origin spawners present in high fractions in most populations outside of the Skagit watershed. Escapement levels for all populations remain well below the Technical Recovery Team (TRT) planning ranges for recovery, and most populations are consistently below the spawner-recruit levels identified by the TRT as consistent with recovery.

Limiting factors for PS Chinook salmon include:
1. Degraded floodplain and in river channel structure.
2. Degraded estuarine conditions and loss of estuarine habitat
3. Degraded riparian areas and loss of in river large woody debris
4. Excessive fine-grained sediment in spawning gravel
5. Degraded water quality and temperature
6. Degraded nearshore conditions
7. Impaired passage for migrating fish
8. Severely altered flow regime

PS Steelhead

We listed the PS steelhead distinct population segment (DPS) as threatened on May 11, 2007 (72 FR 26722). There is a draft recovery plan for this DPS (NMFS 2018). The most recent status review was in 2015 (NWFSC 2015). This DPS comprises 32 populations. The DPS is currently at very low viability, with most of the 32 populations and all three population groups at low viability. Long-term abundance trends have been predominantly negative or flat across the DPS. Information considered during the most recent status review indicates that the biological risks

faced by the PS Steelhead DPS have not substantively changed since the listing in 2007, or since the 2011 status review. Furthermore, the PS Steelhead TRT recently concluded that the DPS was at very low viability, as were all three of its constituent major population groups (MPGs), and many of its 32 populations. In the near term, the outlook for environmental conditions affecting PS steelhead is not optimistic. While harvest and hatchery production of steelhead in PS are currently at low levels and are not likely to increase substantially in the foreseeable future, some recent environmental trends not favorable to PS steelhead survival and production are expected to continue.

Limiting factors for PS steelhead include:
1. Continued destruction and modification of habitat
2. Widespread declines in adult abundance despite significant reductions in harvest
3. Threats to diversity posed by use of two hatchery steelhead stocks
4. Declining diversity in the DPS, including the uncertain but weak status of summer-run fish
5. A reduction in spatial structure
6. Reduced habitat quality
7. Urbanization
8. Dikes, hardening of banks with riprap, and channelization

PS/GB Bocaccio

We listed the PS/GB bocaccio DPS as endangered on April 28, 2010 (75 FR 22276). A recovery plan for PS/GB bocaccio was published by NMFS in 2017 (NMFS 2017a). The most recent status review was in 2016 (NMFS 2016). Though bocaccio were never a predominant segment of the multi-species rockfish population within the PS/GB, their present-day abundance is likely a fraction of their pre-contemporary fishery abundance. Most bocaccio within the DPS may have been historically spatially limited to several basins within the DPS. They were apparently historically most abundant in the Central and South Sound with no documented occurrences in the San Juan Basin until 2008. The apparent reduction of populations of bocaccio in the Main Basin and South Sound represents a further reduction in the historically spatially limited distribution of bocaccio, and adds significant risk to the viability of the DPS.

Limiting factors for PS/GB bocaccio include:
1. Over harvest
2. Water pollution
3. Climate-induced changes to rockfish habitat
4. Small population dynamics

PS/GB Yelloweye Rockfish

We listed the PS/GB yelloweye rockfish DPS as threatened on April 28, 2010 (75 FR 22276). A recovery plan for PS/GB yelloweye rockfish was published by NMFS in 2017 (NMFS 2017a). The most recent status review was in 2016 (NMFS 2016). Yelloweye rockfish within the PS/GB (in United States waters) are very likely the most abundant within the San Juan Basin of the DPS. Yelloweye rockfish spatial structure and connectivity is threatened by the apparent reduction of fish within each of the basins of the DPS. This reduction is probably most acute within the basins of PS proper. The severe reduction of fish in these basins may eventually result in a contraction of the DPS' range.

Limiting factors for PS/GB yelloweye rockfish include:
1. Over harvest
2. Water pollution
3. Climate-induced changes to rockfish habitat
4. Small population dynamics

2.2.3. 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).

Puget Sound Chinook Salmon

We designated critical habitat for PS Chinook salmon on September 2, 2005 (70 FR 52630). Critical habitat for PS Chinook salmon includes 1,683 miles of streams, 41 square miles of lakes, and 2,182 miles of nearshore marine habitat in PS. The PS Chinook salmon ESU has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value. Marine habitat threats include urbanization, wetland draining and conversion, dredging, armoring of shorelines, and marina and port development. These activities have diminished the availability and quality of nearshore marine habitats and reduced water quality across the region.

Puget Sound/Georgia Basin Bocaccio

We designated critical habitat for the PS/GB DPS of bocaccio on November 13, 2014 (79 FR 68042). Critical habitat for bocaccio rockfish includes 590.4 square miles of nearshore habitat and 414.1 square miles of deepwater habitat. Critical habitat is not designated in areas outside of United States jurisdiction; therefore, although waters in Canada are part of the DPSs' ranges for this species, critical habitat was not designated in that area. Based on the natural history of bocaccio and their habitat needs, NMFS identified two PBFs, essential for their conservation: 1) Deepwater sites (>30 meters) that support growth, survival, reproduction, and feeding opportunities; 2) Nearshore juvenile rearing sites with sand, rock and/or cobbles to support forage and refuge. Habitat threats include degradation of rocky habitat, loss of eelgrass and kelp, introduction of non-native species that modify habitat, and degradation of water quality as specific threats to rockfish habitat in the Georgia Basin.

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this project includes the footprint of the project and adjacent aquatic areas within 0.46 miles due to the spatial extent of underwater sound (Section 2.5.1).

2.4. Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

As discussed in Section 1.3, the vessels most likely to moor at Pier 1 are tug boats, ferries, and fishing, military, and research vessels ranging from 90 feet to 330 feet in length (Dakota Creek Industries Inc. 2018). In-water noise in the action area is primarily characterized by vessel traffic from tug boats, fishing and passenger vessels (i.e., ferries) and cargo ships (MarineTraffic 2018). In a study conducted at the nearby Anacortes ferry terminal, background sound levels ranged between 99 decibels (dB) and 146 dB for all frequencies measured between 1 Hertz (Hz) and 20 kilohertz (kHz) (Laughlin 2015). The 50th percentile of sound levels was 130 dB.

The shoreline is degraded from shoreline development and maritime activities in the channel and by nearby upland urbanization. Substrate at the project site consists of cobbles, gravel, coarse sand, and silt. From 0 to -4 feet MLLW, there is eelgrass west of the pier within 25 feet of the existing pier. Macroalgae exists throughout the project site. According to the Washington State Forage Fish Spawning Map (WDFW 2018), forage fish (surf smelt, sand lance, and Pacific herring) spawning habitat has not been documented at the project site. The closest known spawning ground for surf smelt is approximately 0.15 miles southwest along the beach at North Avenue Park. Pacific herring spawning and pre-spawner holding areas are located approximately 2 miles east of the project site in Fidalgo Bay.

Past and ongoing anthropogenic impacts, including climate change, described in Section 2.2 have impacted ESA-listed species and critical habitat present in the action area. Historical use of the site for vessel moorage, bulk fuel and oil storage and distribution, and shipbuilding activities and repairs resulted in soil, groundwater, and sediment contamination. In 2008, the Port of Anacortes and the Washington State Department of Ecology (Ecology) removed contaminated sediment at the site. The project site is currently listed on the Washington State 303(d) list of impaired waterways for water quality, but not sediment quality (Ecology 2018).

Juvenile PS Chinook are nearshore oriented (Fresh 2006). Peak juvenile abundance in the nearby Padilla Bay is expected to occur from June through October (Rice et al. 2011). Juvenile PS steelhead primarily emigrate from natal streams in April and May (outside the in-water work window), and appear to move directly out into the ocean to rear, spending little time in the nearshore zone (Goetz et al. 2015). They are not commonly caught on beach seine surveys (Brennan et al. 2004).

Adult PS Chinook can reside in PS year-round, and return to their natal river between June and September. Adult winter-run PS steelhead typically return to their natal river November through May; summer-run PS steelhead return between April and October. Adult PS Chinook salmon and PS steelhead usually inhabit water much deeper than the areas adjacent to where Pier 1 is located.

Pacunski et al. (2013) surveyed the San Juan Islands by remotely operated underwater vehicle (ROV) between September and November 2008. They observed bocaccio and yelloweye rockfish southeast of Guemes Island. Rockfish fertilize their eggs internally and extrude the young as larvae, which are approximately 4 millimeters to 5 millimeters in length (Love et al. 2002). Larval rockfish appear in the greatest numbers during the spring months (Greene and Godersky 2012; Moser and Boehlert 1991; Palsson et al. 2009). However, PS rockfish have been reported to extrude larvae as late as September (Greene and Godersky 2012). Rockfish larvae are typically found in the pelagic zone, often occupying the upper layers of open waters, under floating algae, detached seagrass, and kelp. Rockfish larvae are thought to be mostly distributed passively by currents (Love et al. 2002).

Juvenile rockfish move from the pelagic environment and associate with the benthic environment when they reach about 30 to 90 millimeters in length at approximately 3 to 6 months of age (Love et al. 2002). Juvenile bocaccio are known to settle onto rocky or cobble substrates in the shallow nearshore in areas that support kelp and sandy zones with eelgrass or drift algae. They move to progressively deeper waters as they grow (Love et al. 2002; Palsson et al. 2009). At the project site, the SPIF documents gravel and cobble substrate, typical of juvenile rockfish habitat. The SPIF also documents eelgrass within 25 feet of the existing pier.

Yelloweye rockfish are not known to typically occupy shallow water habitats (Love et al. 2002). Juvenile yelloweye rockfish between 25 and 100 millimeters have been observed in areas of high relief at depths greater than 48 feet (Love et al. 2002). These conditions are not supported in the action area.

Adult yelloweye and bocaccio typically occupy waters deeper than 300 feet and 165 feet, respectively (Love et al. 2002) and prefer rocky habitats. Given these depths do not occur in the action area, it is extremely unlikely that adult ESA-listed rockfish will occur within the shallow water in the action area.

2.5. Effects of the Action

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

As discussed in Section 1.3, the proposed action meaningfully extends the life of Pier 1. Therefore, future impacts of the structure (i.e., effects associated with its presence in the environment, separate from the effects associated with its construction) are considered "effects of the action" under this consultation.

2.5.1. Effects on Species

Underwater Noise

NMFS established the injury thresholds for impulsive sound at 206 dB peak, 187 dB cumulative sound exposure level (SEL_{cum}) for fish more than 2 grams, and 183 dB SEL_{cum} for fish less than

2 grams (Fisheries Hydroacoustic Working Group 2008). The behavioral disturbance threshold is 150 dB root mean square (RMS). Any received level below 150 dB sound exposure level (SEL) is considered "Effective Quiet" (Stadler and Woodbury 2009).

Noise generated from impact driving 12-inch timber piles is estimated based on single strike noise levels of 180 dB peak, 160 dB SEL, and 170 dB RMS at 10 meters (WSDOT 2017). Given maximum of 2,000 pile strikes per day, impact pile driving/proofing will exceed the NMFS accepted threshold for behavioral disturbance and onset of physical injury for fish larger than 2 grams and fish less than 2 grams (see Table 1). The noise from impact pile driving/proofing will attenuate to the behavioral threshold within 215 meters, the injury threshold for fish less than 2 grams within 46 meters, and the injury threshold for fish larger than 2 grams within 25 meters.

Table 1. Distance to reach NMFS accepted threshold for behavioral disturbance and the onset of physical injury to fish from unattenuated impact pile driving/proofing under the proposed project.

	Onset of Physical Injury			**Behavior**
	Peak	Cumulative SEL dB		RMS
	dB	Fish ≥ 2 g	Fish < 2 g	dB
NMFS accepted threshold	206	187	183	150
Distance (m) to threshold	**NA**	**25**	**46**	**215**

Fish within 215 meters of impact pile driving may respond to the first few strikes of the impact hammer with a startle response, but then the startle response will wane, and fish will likely remain within the area (Dolat 1997). Fish that remain within the injury zone of impact pile driving may experience injury to auditory tissues. However, the sound wave from a strike to a wooden pile is more rounded than a steel pile. Although the peak levels may be similar, the waveform appears more stretched out for a timber pile, and the rise time is relatively slower. A slower rise time means that the shock wave produced with each pile strike is not as severe, presumably resulting in less damage to fish. Also, the injury zones are based on fish being exposed to all 2,000 strikes in one day. For these reasons, this analysis likely overestimates the injury zones and likelihood of injury.

Adult PS Chinook salmon and PS steelhead will be larger than 2 grams, highly mobile, and will be migrating past the site in route to their natal streams. However, juvenile PS Chinook salmon and juvenile PS/GB bocaccio are likely to remain in the action area given the presence of rearing habitat. Therefore, they may accumulate injurious levels of sound energy. Bocaccio and yelloweye rockfish larvae will be less than 2 grams in size. Larvae will be briefly exposed as they pass through the area on the currents. The number of individuals of each species that may be impacted by this stressor is unquantifiable with any degree of certainty.

While impact pile driving produces an intense impulsive underwater noise, vibratory pile driving produces a lower level continuous noise (Duncan et al. 2010) that does not injure fish. Fish consistently avoid sounds like those of a vibratory hammer (Dolat 1997; Enger et al. 1993; Knudsen et al. 1997; Sand et al. 2000) and appear not to habituate to these sounds, even after repeated exposure (Dolat 1997; Knudsen et al. 1997). Illingworth & Rodkin (2017) report an underwater sound level 158 dB RMS at 10 meters for vibratory driving of timber piles. Given a

maximum duration of 1.5 hours (5,400 seconds), the noise from the pile installation/extraction will attenuate to 150 dB RMS within 34 meters.

Any adult Chinook salmon, adult steelhead, and juvenile boccacio could be displaced from the area of acoustic effect (34 meters) during the 1.5 hours of vibratory pile driving/extraction. However, given the short duration of the installation/extraction and the availability of similar habitat adjacent to the affected area, individuals are extremely unlikely to experience any adverse effects from vibratory pile installation. We do not expect any effects to PS/GB bocaccio and PS/GB yelloweye rockfish larvae from vibratory pile installation/extraction as they are unable to swim away from affected areas.

After piles are repaired and replaced, vessel moorage at the pier will continue into the foreseeable future. The vast majority of that activity will likely occur during daylight hours, but some pre-dawn or post-dusk engine running and vessel movement may take place at the site. In the absence of specific use estimates, this assessment assumes that on any given day, 12 hours of continuous vessel noise is likely to occur, which likely overestimates exposure risk most of the time. Unlike construction noises, vessel noise could occur year-round. As discussed in Section 1.3, the vessels most likely to moor at Pier 1 are tug boats, ferries, and fishing, military, and research vessels ranging from 90 feet to 330 feet in length (Dakota Creek Industries Inc. 2018). The best available information for source levels of those vessel classes (Table 2) is Veirs et al. (2016). However, the available information describes vessels running at or close to full-speed, which is likely to overestimate exposure risk. Because SEL is often identical to RMS for non-impulsive sources, we assume that reported sound levels by Veirs et al. (2016) are in dB RMS which would, at worst, overestimate sound levels. To conservatively estimate source levels, we also assume that the mean plus the standard deviation represents the source level for each vessel class.

Table 2. Source level (dB) by vessel class and distance to behavioral threshold for fish.

Vessel Class	Source Level (dB) ± Standard Deviation	Distance (meters) to behavioral threshold
Tug	170±5	46
Passenger	166±8	40
Fishing	164±9	34
Military	161±5	12
Research	167±5	29

Based on the best available information, the expected source levels are well below the thresholds for the onset of injury in fish, and fish will be unaffected by noise levels under 150 dB SEL (Stadler and Woodbury 2009). Given the tug boats have the highest maximum source level (175 dB), we conservatively assume that the area of continuous acoustic affect (above 150 dB SEL) will include all of the water within 46 meters around Pier 1.

The area of continuous acoustic effect will overlap with the eelgrass bed and extend out to where water depths are about 15 meters. That area is within habitat considered most likely to be occupied by juvenile PS Chinook salmon, and overlaps with habitat that would support juvenile bocaccio (eelgrass). As discussed in Section 2.4, adult PS Chinook, and adult and juvenile PS steelhead are not nearshore dependent but may pass through the area of acoustic effect during migration. Given the small size of the area of acoustic effect and availability of similar habitat in the surrounding area, any avoidance of the action area will not have a meaningful effect on these species. Therefore, vessel noise will not affect the fitness or normal behaviors of listed species.

Turbidity

In-water pile removal and driving will cause short-term and localized increases in turbidity and total suspended solids (TSS). Because extracted piles will be surrounded by a full depth silt curtain and pile removal will be limited to vibratory extraction and/or simple pull techniques (Section 1.3), mobilized sediments during pile extraction will not exceed 300 feet from the project site (NMFS 2017b). Any elevations in TSS will be within normal fluctuations of TSS levels in the action area and will return to background levels quickly. Therefore, listed salmonids and rockfish are extremely unlikely to experience any adverse effects from elevated TSS.

Mobilization of anaerobic sediments can decrease dissolved oxygen (DO) levels (Hicks et al. 1991; Morton 1976). However, given the small amount of sediment that will be mobilized by this project, combined with the high level of water exchange in the action area, any impacts on DO will be too small and short-lived to affect listed fish.

Contaminants

Toxic materials will be introduced to the water through the mobilization of contaminated sediments and the release of creosote-related polycyclic aromatic hydrocarbons (PAHs) directly from the piles and the surrounding soil during their removal or repair. Vibratory pile removal will be limited to vibratory extraction and/or simple pull techniques. Pile removal will be surrounded by a full depth silt curtain. Most lighter-weight PAHs will dissipate within a few hours after their release into the water through evaporation and dilution (Smith 2008; Werme et al. 2010). The remaining contaminants will quickly settle out of the water along with the sediments, or be quickly diluted by the high rate of water exchange in the channel.

Presently, creosote-treated piles contaminate the surrounding sediment up to two meters away with PAHs (Evans et al. 2009). Cutting or removing the creosote-treated piles mobilizes these PAHs into the surrounding water and sediments (Parametrix 2011; Smith 2008). The project will also release PAHs directly from creosote-treated timber during the demolition of the deck and if any of the piles break during removal (Parametrix 2011). The concentration of PAHs released into surface water rapidly dilutes. Smith (2008) reported concentrations of total PAHs of 101.8 µg/l 30 seconds after creosote-pile removal and 22.7 µg/l60 seconds after. However, PAH levels in the sediment after pile removal can remain high for six months or more (Smith 2008). Romberg (2005) found a major reduction in sediment PAH levels three years after pile removal contaminated an adjacent sediment cap.

There are two pathways for PAH exposure to listed fish species in the action area, direct uptake through the gills and dietary exposure (Karrow et al. 1999; Lee and Dobbs 1972; McCain et al.

1990; Meador et al. 2006; Neff et al. 1976; Roubal et al. 1977; Varanasi et al. 1993). Fish rapidly uptake PAHs through their gills and food but also efficiently remove them from their body tissues (Lee and Dobbs 1972; Neff et al. 1976). Juvenile Chinook salmon prey, including amphipods and copepods, uptake PAHs from contaminated sediments (Landrum et al. 1984; Landrum and Scavia 1983; Neff 1982).Varanasi et al. (1993) found high levels of PAHs in the stomach contents of juvenile Chinook salmon in the Duwamish estuary.

The primary effects of PAHs on salmonids from both uptake through their gills and dietary exposure are immunosuppression and reduced growth. Karrow et al. (1999) characterized the immunotoxicity of creosote to rainbow trout (*Oncorhynchus mykiss*) and reported a lowest observable effect concentration for total PAHs of 17 µg/l. Varanasi et al. (1993) found greater immune dysfunction, reduced growth, and increased mortality compared to control fish. In order to isolate the effects of dietary exposure of PAHs on juvenile Chinook salmon, Meador et al. (2006) fed a mixture of PAHs intended to mimic those found by Varanasi et al. (1993) in the stomach contents of field-collected fish. These mixture-fed fish showed reduced growth compared to the control fish.

Listed fish that currently use the habitat near the pier are likely to be exposed to PAHs. The magnitude of the exposure will greatly increase during removal of the creosote-treated timber piles. NMFS expects increased PAHs in the water column and sediments will remain within the area of increased suspended sediment caused by the project. Therefore, the water and substrate within 300 feet of pile removal activities will have increased levels of PAHs (NMFS 2017b). Within three years after construction, the removal of the creosote-treated timber will reduce listed-fish exposure to PAHs in the long-term. Some of the listed fish exposed to PAHs from the proposed action will experience immunosuppression and reduced growth which, in some cases will increase the risk of death. Because they are shoreline-oriented and spend a greater amount of time within the action area, juvenile Chinook salmon and bocaccio will have the highest probability of exposure to PAHs. However, NMFS cannot discount the probability of adult and juvenile steelhead, adult Chinook salmon, or bocaccio and yelloweye rockfish larvae exposure.

Within this area, contaminants may be biologically available for years, at steadily decreasing levels. While present, contaminants such as PAHs are likely to bioaccumulate in benthic invertebrates (Landrum et al. 1984; Landrum and Scavia 1983; Neff 1982), some of which will be consumed by juvenile Chinook salmon and juvenile bocaccio that forage in Guemes Channel. Fish have low PAH retention (Niimi and Dookhran 1989; Niimi and Palazzo 1986) and metabolize PAHs rapidly (Hellou and Payne 1986; Roubal et al. 1977; Statham et al. 1978; Varanasi et al. 1989). Nevertheless, even brief exposure to PAH-contaminated habitats has been shown to reduce growth, suppress immune competence, and increased mortality in outmigrating juvenile Chinook salmon (Varanasi et al. 1993). Meador et al. (2006) also found that dietary exposure to PAHs causes reduced growth and reduced lipid stores in juvenile Chinook salmon. Juvenile PS/GB bocaccio are not specifically addressed in the available literature, but it is reasonable to expect that they may be similarly affected by dietary uptake of action-related contaminants. In contrast, it is unlikely that adult listed salmonids and rockfish that feed on forage fish would be impacted as biomagnification of PAHs does not occur in fish (Suedel et al. 1994).

The annual number of juvenile Chinook salmon and bocaccio that may be exposed to PAH-contaminated forage that will be attributable to this action is unquantifiable with any degree of certainty, as is the amount of contaminated prey that any individual fish may consume, or the intensity of any effects that an exposed individual may experience. However, the small affected area and the low volume of contaminated sediment that would be brought to the surface suggest that the probability of trophic connectivity to the contamination would be very low for any individual fish. Therefore, the numbers of fish that may be annually exposed to contaminated prey would be very low, and no detectable effects at the population level for Chinook salmon and bocaccio are expected.

Repaired and replaced piles and decking will be comprised of timber that has been treated with ACZA. Wet ACZA-treated wood leaches some of the metals used for wood preservation. Of these metals, dissolved copper is of most concern to fish because of its higher leaching rate in the marine environment compared to arsenic and zinc (Poston 2001). However, Brooks (2004) reports that ACZA-treated wood used for in- and over-water marine structures caused no significant increase in copper concentrations in the water, sediments*, and benthic biota adjacent to those structures (* the in-sediment concentration of copper located within one multi-pile dolphin was higher than at control sites). Additionally, copper is much less toxic to fish in saltwater than in freshwater. Baldwin (2015) report no toxicity was reported for copper concentrations below 50 µg/L in estuarine waters with a salinity of 10 parts per thousand (ppt), as compared to 0.3 to 3.2 µg/L in freshwater. Sommers et al. (2016) report no copper-related impairment of olfactory function in salmon in saltwater. Sublethal copper toxicity in bocaccio is not yet understood, but may be similar to that of salmonids. As the salinity at the project site is likely close to 30 ppt, dissolved copper concentrations at the site are expected to be well below the threshold of effect in salmonids and other fish like bocaccio.

Vessels that will continue to moor at the pier may discharge petroleum-based fuels and lubricants that contain PAHs. As described earlier, the potential effects of exposure to PAHs can range from avoidance of an area to mortality, depending on the compound and its concentration (Meador et al. 2006). Fueling is allowed at the mooring, but discharges of petroleum-based fuels and lubricants from the vessels that will utilize the moorage are typically infrequent and very small. The fuels and lubricants that will be used tend to evaporate quickly, with PAH dissipating within a few hours (Werme et al. 2010). Further, the moorage is open and exposed to regular strong tidal currents that will quickly dilute and mix discharged fuels and lubricants, and facilitate the evaporation and/or bioremediation of any petroleum-based chemicals that may be released. Based on the available information, the concentrations and residence times of vessel-related petroleum-based substances will be too low to cause detectable effects.

Shade

Intense shade can limit primary production and reduce the diversity of the aquatic communities under over-water structures (Nightingale and Simenstad 2001; Simenstad et al. 1999). In the action area, this could result in reduced SAV which provides shelter for juvenile PS Chinook salmon and PS/GB bocaccio, as well as benthic invertebrates that directly and indirectly provide forage resources. Therefore, shade from the pier may impact productivity and diversity of the aquatic communities within its footprint across the intertidal and subtidal zone. However, the small size of the total affected area as compared to the rest of the benthic habitat at this site,

suggest that any reduction in the availability of cover and/or prey for juvenile PS Chinook salmon and juvenile PS/GB bocaccio will be undetectable.

Vessel mooring will be situated over relatively deep water (-22 MLLW and deeper), well away from all but a very small corner of the existing eelgrass to the west of the pier. At those depths, vessel shade will be minimally detectable near the substrate, and will cause no more than minimal effects on the productivity and diversity of the aquatic communities within its footprint. Consequently, the effects of the structure's shade will be undetectable in juvenile PS Chinook salmon and juvenile PS/GB bocaccio.

In the shallow nearshore waters of where juvenile PS Chinook salmon will most likely occur at the site, the existing structure will be between +10 MHHW and -22 feet MLLW, between 63 feet and 110 feet wide, and solid-decked. Therefore, it will cast an intense shadow. Numerous studies demonstrate that juvenile salmon, in both marine and freshwater habitats, are more likely to avoid the shadow of an overwater structure than to pass through the shadow (Celedonia et al. 2008a; Celedonia et al. 2008b; Kemp et al. 2005; Moore et al. 2013; Munsch et al. 2014; Nightingale and Simenstad 2001; Ono et al. 2010; Southard et al. 2006).

An implication of juvenile salmon avoiding overwater structures is that some of them will swim around the structure (Nightingale and Simenstad 2001). This behavioral modification will cause them to temporarily utilize deeper habitat, thereby exposing them to increased piscivorous predation. This has been shown in the marine environment where juvenile salmonid consumption by piscivorous predators increased fivefold when juvenile pink salmon were forced to leave the shallow nearshore (Willette 2001). Further, swimming around overwater structures lengthens the salmonid migration route, which is correlated with increased mortality (Anderson et al. 2005). In summary, the increase in migratory path length from swimming around the pier as well as the increased exposure to piscivorous predators in deeper water likely will result in proportionally increased juvenile PS Chinook mortality.

The annual number of juvenile PS Chinook salmon that may be exposed to increased predation and longer migration distances attributable to this action is unquantifiable with any degree of certainty. However, the small affected area suggests that the probability of mortality would be very low for any individual fish. Therefore, the numbers of fish that may be annually exposed to increased predation and longer migration distances will be very low, and no detectable effects at the population level are expected.

Adult PS Chinook salmon and PS steelhead will likely be too large to be affected by increased predation due to their size. Juvenile PS steelhead will move quickly through the channel and will be relatively large and free from shoreline obligation. Therefore, like adults, they are unlikely to face increased predation due to the presence of the structure.

Unlike salmonids, juvenile rockfish migration and risk of predation are not known to be adversely impacted by artificial structures such as piers and docks (Love et al. 2002). The aggregation of some rockfish near docks, piers, and other artificial structure suggests that, harm is unlikely to occur to juvenile PS/GB bocaccio from those structures.

Propeller Wash

Propellers and propeller wash can mobilize sediments and dislodge aquatic organisms, including SAV. In shallow water areas with high levels of vessel traffic, propeller scour can dramatically reduce SAV and diminish the density and diversity of the benthic community. However, the vessels moored at the pier will be situated over relatively deep water (about -22 MLLW and deeper), and the vessels that will operate near it would likely do so at low power levels. Based on the water depths and low power levels expected near the pier, propeller wash will be very unlikely to cause detectable effects on benthic resources. Therefore, there will be no detectable effect on juvenile PS Chinook salmon and juvenile PS/GB bocaccio.

Killgore et al. (2011) report that fish are killed by spinning boat propellers. Propeller-related turbulence has also been documented to kill small aquatic organisms like copepods (Bickel et al. 2011). Small fish and larvae that are exposed to propeller wash may also be displaced by the fast-moving turbulent water. Propeller wash is unlikely to affect adult PS Chinook salmon and PS steelhead, because they are unlikely to approach close enough to operating boats to be exposed. In the unlikely event of adult exposure, their increased size and swimming ability suggest that they will swim away from the propeller wash with no detectable effects other than a very brief avoidance behavior. Juvenile PS/GB boaccio are unlikely to be affected as they are associated with benthic habitat away from the surface where effects are likely to occur.

Juvenile PS Chinook salmon and PS steelhead that migrate past the pier and larval PS/GB bocaccio and PS/GB yelloweye rockfish that drift by the pier are likely to be relatively close to the surface where they may be exposed to spinning propellers and propeller wash, and will be too small to effectively swim against the turbulent water. Therefore, juvenile PS Chinook salmon, juvenile PS steelhead, larval PS/GB bocaccio, and larval PS/GB yelloweye rockfish may be injured, killed, or displaced by propellers or propeller wash. Although the likelihood of this interaction is very low for any individual fish or any individual boat trip, it is likely that over the life of the pier, at least some juvenile Chinook salmon and steelhead and larval rockfish will experience reduced fitness or mortality from exposure to spinning propellers and/or propeller wash at the site. The annual number of individuals that may be impacted by this stressor is unquantifiable with any degree of certainty. However, based on the expectation that exposed individuals would be very small subsets of the cohorts from their respective populations, the numbers of exposed fish will be too low to cause detectable population-level effects.

2.5.2. Effects on Critical Habitat

Past critical habitat designations have used the terms primary constituent elements (PCE) or essential features (EF) to identify important habitat qualities. The new critical habitat regulations (81 FR 7214) replace those terms with physical or biological features (PBF). This shift in terminology does not change the approach used in conducting our analysis, whether the original designation identified PCE, EF, or PBF.

Chinook Salmon

Designated critical habitat within the action area for PS Chinook salmon consists of estuarine and marine rearing sites, migration corridors, and their essential physical and biological features. The PBFs of PS Chinook salmon critical habitat in the action area are nearshore marine areas

free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

Free of Obstruction and Excessive Predation

The proposed action will cause long-term minor effects on obstruction and episodic ephemeral effects on predation. Construction will cause episodic ephemeral elevated noise, activity, and reduced water quality that may cause temporary avoidance of the area by low numbers of PS Chinook salmon. The proposed action will also maintain a longstanding overwater structure that may affect shoreline migration by juveniles. The proposed action will cause no change in the abundance of predators, but the presence of the overwater structure may cause increased predation on juveniles. The proposed action will act to maintain this PBF at a reduced functional level compared to undisturbed areas. Therefore, the action will cause a long-term minor change in the quality and function of this PBF.

Water Quality

The proposed action will cause episodic ephemeral effects on water quality. Construction will briefly mobilize contaminated sediments, and may also very slightly reduce DO in very limited areas. The action will eliminate sources of on-going PAH water contamination through the removal of the existing structure's creosote-treated piles. Detectable construction-related effects on water quality are expected to be limited to the area well within 300 feet around the project site, and are not expected to persist past one or two hours after work stops. Therefore, the action will cause no long-term negative change in the quality and function of this PBF, and it may improve conditions over time.

Water Quantity

The proposed action will have no effect on water quantity, and will cause no change in the quality and function of this PBF.

Forage

The proposed action will cause long-term minor effects on forage. Construction will mobilize small amounts of PAH-contaminated sediments that could be taken up by benthic invertebrates that are forage resources for juvenile salmon. Sediment distribution will be limited to the area well within 300 feet around the project site, but detectable levels of contaminants may persist for years. Construction will not impact forage fish spawning, but the proposed action will maintain structures near their spawning habitat. The structure will maintain this PBF at a slightly reduced functional level compared to undisturbed areas. In summary, the action will not reduce available forage resources, but may slightly increase contamination levels in some prey organisms within about 300 feet of the site. Therefore, the action will cause a long-term minor change in the quality and function of this PBF.

Natural Cover

The proposed action will cause long-term minor effects on natural cover. Increased TSS from construction may temporarily shade small areas of SAV that will recover within months if damaged. The action will also maintain a long-standing overwater structure, portions of which shade eelgrass and macro algae. The proposed action will maintain this PBF at a slightly reduced functional level compared to undisturbed areas. Therefore, the action will cause no long-term negative change in the quality and function of this PBF.

Rockfish

Nearshore areas (less than 30 meters, 98 feet deep, relative to MLLW) with substrates such as sand, rock and/or cobble compositions, that also support kelp, provide settlement habitat for juvenile bocaccio. Designated critical habitat for PS/GB yelloweye rockfish does not occur in the action area. The PBFs for juvenile bocaccio in the action area include juvenile settlement habitats located in the nearshore with substrates such as sand, rock and/or cobble compositions that also support kelp with the following attributes:

- Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities; and
- Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.

Quantity, Quality, and Availability of Prey Species

The proposed action will cause long-term minor effects on forage. Construction will mobilize small amounts of PAH-contaminated sediments that could be taken up by benthic invertebrates that are forage resources for juvenile bocaccio. Sediment distribution will be limited to the area well within 300 feet around the project site, but detectable levels of contaminants may persist for years. Construction will not impact forage fish spawning. The new structure will maintain this PBF at a slightly reduced functional level compared to undisturbed areas. In summary, the action will not reduce available forage resources, but may slightly increase contamination levels in some prey organisms within about 300 feet of the site. Therefore, the action will cause a long-term minor change in the quality and function of this PBF.

Water Quality

The proposed action will cause episodic ephemeral effects on water quality. Construction will briefly mobilize contaminated sediments, and may also very slightly reduce DO in very limited areas. The action will also eliminate sources of on-going PAH water contamination through the removal of the existing structure's creosote-treated piles. Detectable construction-related effects on water quality are expected to be limited to the area well within 300 feet around the project site, and are not expected to persist past one or two hours after work stops. Therefore, the action will cause no long-term negative change in the quality and function of this PBF, and it may improve conditions over time.

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). Vessel activity associated with Pier 1 is likely to continue in the future. As discussed in Section 2.5, vessel activity may impact listed species through increased underwater noise, exposure to PAHs, and propeller wash.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat

(Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

2.7.1. ESA-listed Species

The species considered in this Opinion have been listed under the ESA, based on declines from historic levels of abundance and productivity, loss of spatial structure and diversity, and an array of limiting factors as a baseline habitat condition. Each species will be affected over time by cumulative effects, some positive – as recovery plan implementation and regulatory revisions increase habitat protections and restoration, and some negative – as climate change and unregulated or difficult to regulate sources of environmental degradation persist or increase. Overall, to the degree that habitat trends are negative, as described below, effects on viability parameters of each species are also likely to be negative. In this context we consider the effects of the proposed action's effect on individuals of the listed species at the population scale. The action area provides habitat for nearshore marine life histories of PS Chinook salmon, PS steelhead, PS/GB bocaccio, and PS/GB yelloweye rockfish.

Chinook Salmon

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

The environmental baseline within the action area has been moderately degraded from shoreline development and maritime activities in the channel, and by nearby upland urbanization. The project site is currently listed on the Washington State 303(d) list of impaired waterways for water quality (Ecology 2018). However, the area remains supportive of PS Chinook salmon. Eelgrass is present within 25 feet of Pier 1, which provides cover and forage for rearing and migrating individuals.

Project-related work will largely avoid the presence of out-migrating juvenile PS Chinook salmon and only slightly overlaps with the presence of returning adults. During construction, very low numbers of juveniles and adults may experience injury or displacement due to noise. For the first few years following construction, out-migrating juveniles may be exposed to ever-decreasing levels of contaminated forage, due to mobilization of small amounts of contaminated sediments during pile removal. Consumption of contaminated forage may reduce growth, increase susceptibility to infection, and increase mortality in some individuals. The shade cast by the pier may increase mortality in juvenile PS Chinook salmon through increased predation and migratory path length. Propellers and propeller wash associated with continued use of the structure may also injure, kill, or displace juvenile PS Chinook salmon. The number of PS Chinook salmon that are likely to be injured or killed by action-related stressors is unknown, but is expected to be very low, and such a small fraction of a returning cohort that it will have no

detectable effect on any of the characteristics of a viable salmon population (VSP), abundance, productivity, distribution, or genetic diversity) for the affected population(s). Similarly, the annual number of juveniles that are likely to be injured or killed by exposure to action-related stressors is also unknown, but is expected to be too low to cause detectable effects on any VSP characteristics for the affected population(s).

The proposed action will allow the continued existence of an overwater structure that will keep certain habitat conditions at slightly reduced functional levels as compared to undisturbed areas. However, the structure will not cause or worsen any habitat conditions in a manner that would act to limit the recovery of this species. Based on the best available information, the scale of the direct and indirect effects of the proposed action, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, will be too small to cause any population level impacts on PS Chinook salmon. Therefore, the proposed action will not appreciably reduce the likelihood of survival and recovery of this listed species.

Steelhead

The action area supports adult and juvenile migration. The DPS is currently at very low viability, and long-term abundance trends have been predominantly negative or flat across the DPS. Continued destruction and modification of habitat, widespread declines in adult abundance, and declining diversity appear to be the greatest threats to the recovery of PS steelhead. Reduced habitat quality and urbanization also continue to impact this species.

The environmental baseline within the action area has been moderately degraded from shoreline development and maritime activities in the channel, and by nearby upland urbanization. The project site is currently listed on the Washington State 303(d) list of impaired waterways for water quality (Ecology 2018). However, the area remains supportive of migrating PS steelhead.

Project-related work will avoid the presence of out-migrating juvenile PS steelhead, but will overlap with the presence of returning adults. During construction, very low numbers of adults may experience injury or displacement due to noise. Propellers and propeller wash associated with continued use of the pier may also injure, kill, or displace juvenile PS steelhead. The number of PS steelhead that are likely to be injured or killed by action-related stressors is unknown, but is expected to be very low, and such a small fraction of a returning cohort that it will have no detectable effect on any of the characteristics of a VSP, abundance, productivity, distribution, or genetic diversity) for the affected population(s). Similarly, the annual number of juveniles that are likely to be injured or killed by exposure to action-related stressors is also unknown, but is expected to be too low to cause detectable effects on any VSP characteristics for the affected population(s).

Based on the best available information, the scale of the direct and indirect effects of the proposed action, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, will be too small to cause any population level impacts on PS steelhead. Therefore, the proposed action will not appreciably reduce the likelihood of survival and recovery of this listed species.

Bocaccio

The action area may support juvenile rearing and larvae. No reliable population estimates are available for the DPS, but the best available information indicates that bocaccio were never a predominant segment of the total rockfish abundance in Puget Sound, and suggest that their present-day abundance is likely a fraction of their pre-contemporary fishery abundance. Fishing removals and degraded water quality appear to be the greatest threats to the recovery of the DPS.

The environmental baseline within the action area has been moderately degraded from shoreline development and maritime activities in the channel, and by nearby upland urbanization. The project site is currently listed on the Washington State 303(d) list of impaired waterways for water quality (Ecology 2018). However, the area remains supportive of juvenile and larval PS/GB bocaccio. Eelgrass is present within 25 feet of Pier 1, which provides cover and forage for rearing individuals.

The construction work window largely overlaps with the timing for benthic juveniles in the Puget Sound region. Should individuals be present during construction, very low numbers of juveniles may be injured or displaced due to noise. For the first few years following construction, very low numbers of rearing juveniles may be exposed to ever-decreasing levels of contaminated forage, due to mobilization of small amounts of contaminated sediments during pile removal. Consumption of contaminated forage may reduce growth, increase susceptibility to infection, and increase mortality in some individuals. Propellers and propeller wash associated with continued use of the structure may also injure, kill, or displace PS/GB bocaccio larvae. The number of juvenile and larval PS/GB bocaccio that are likely to be injured or killed by action-related stressors is unknown, but is expected to be extremely low, and such a small fraction of a cohort that it will have no detectable effect on any of the characteristics of a viable population (abundance, productivity, distribution, or genetic diversity) for this DPS.

The proposed action will allow the installation of an overwater structure that will keep certain habitat conditions at slightly reduced functional levels as compared to undisturbed areas. However, the structure will not cause or worsen any habitat conditions in a manner that will act to limit the recovery of this species. Based on the best available information, the scale of the direct and indirect effects of the proposed action, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, will be too small to cause any population level impacts on PS/GB bocaccio. Therefore, the proposed action will not appreciably reduce the likelihood of survival and recovery of this listed species.

Yelloweye Rockfish

The action area may support larvae. Best available information suggests that the present-day abundance of yelloweye rockfish in PS is likely a fraction of their pre-contemporary fishery abundance. Fishing removals and degraded water quality appear to be the greatest threats to the recovery of the DPS.

The environmental baseline within the action area has been moderately degraded from shoreline development and maritime activities in the channel, and by nearby upland urbanization. The project site is currently listed on the Washington State 303(d) list of impaired waterways for

water quality (Ecology 2018). However, the area remains supportive of PS/GB yelloweye rockfish larvae.

As discussed above, there will be no population-level effects for PS Chinook salmon and PS/GB bocaccio. Thus, there will be no detectable effect on forage availability for the adult PS/GB yelloweye rockfish that prey on them. Further, the number of juvenile PS Chinook salmon and juvenile PS/GB bocaccio that may consume contaminated prey at the site will be very low, only a small subset of those individuals may be consumed by PS/GB yelloweye rockfish, and biomagnification of PAHs does not occur in fish (Suedel et al. 1994). Therefore, the action is extremely unlikely to cause detectable levels of contaminants in PS/GB yelloweye rockfish.

Propellers and propeller wash associated with continued use of the structure may also injure, kill, or displace larval PS/GB yelloweye rockfish. The number of PS/GB yelloweye rockfish larvae that are likely to be injured or killed by action-related stressors is unknown, but is expected to be extremely low, and such a small fraction of a cohort that it will have no detectable effect on any of the characteristics of a viable population (abundance, productivity, distribution, or genetic diversity) for this DPS.

Based on the best available information, the scale of the direct and indirect effects of the proposed action, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, will be too small to cause any population level impacts on PS/GB yelloweye rockfish. Therefore, the proposed action will not appreciably reduce the likelihood of survival and recovery of this listed species.

2.7.2. Critical Habitat

As described above at Section 2.5.2, the proposed action is likely to adversely affect designated critical habitat for PS Chinook salmon and PS/GB bocaccio.

Chinook Salmon

For PS Chinook salmon critical habitat, past and ongoing anthropogenic activities have diminished the availability and quality of nearshore marine habitats and reduced water quality across the Puget Sound basin. Marine habitat threats include urbanization, wetland draining and conversion, dredging, armoring of shorelines, and marina and port development. Future non-federal actions and climate change are likely to increase and continue acting against the quality of salmonid critical habitat. The intensity of those influences on salmonid habitats is uncertain, as is the degree to which those impacts may be tempered by adoption of more environmentally acceptable land use practices, implementation of non-federal plans that are intended to benefit salmonids, and efforts to address the effects of climate change.

The PBF for PS Chinook salmon critical habitat in the action area are limited to nearshore marine areas free of obstruction and excessive predation. The site attributes of those PBF that will be affected by the action are limited to water quality, natural cover, and forage that support juvenile growth and maturation. As described above, the environmental conditions within the action area have been moderately degraded by past and ongoing human activity, but remain supportive of PS Chinook salmon. Eelgrass is present within 25 feet of Pier 1, which provides cover and forage for juvenile PS Chinook salmon.

The proposed action will cause minor episodic ephemeral effects on water quality and natural cover, and long term minor effects on forage. Construction will cause brief minor impacts on water quality within about 300 feet of the site. Increased TSS from construction may temporarily shade small areas of SAV that would recover within months if damaged. The proposed action will cause no measurable changes in availability of forage resources, but may slightly increase prey contamination within about 300 feet of the site for a low number of years. The proposed action will also cause long-term beneficial effects on water and sediment quality by removing creosote-treated piles, the source of PAH contamination at the site.

The proposed action will cause long-term minor effects on obstruction and natural cover, and episodic ephemeral effects on predation. Construction will cause episodic ephemeral elevated noise, activity, and reduced water quality that may cause temporary avoidance of the area by low numbers of PS Chinook salmon. The proposed action will also maintain a longstanding overwater structure that may affect shoreline migration by juveniles. The proposed action will cause no change in the abundance of predators, but the presence of the overwater structure may cause increased predation. Additionally, the structure will continue to shade eelgrass and macro algae at the site. The proposed action will act to maintain this PBF at a reduced functional level compared to undisturbed areas. Therefore, the action will cause a long-term minor change in the quality and function of this PBF.

The proposed action will extend the life of an overwater structure (Pier 1) that will keep certain habitat conditions at slightly reduced functional levels as compared to undisturbed areas. However, based on the best available information, the scale of the proposed action's effects, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, will be too small to cause any detectable long-term negative changes in the quality or functionality of the estuarine and nearshore marine area PBFs in the action area. Therefore, this critical habitat will maintain its current level of functionality, and retain its current ability for PBF to become functionally established, to serve the intended conservation role for PS Chinook salmon.

Bocaccio

For PS/GB bocaccio critical habitat, nearshore critical habitat has been degraded by past and ongoing shoreline development that has altered shoreline substrates, degraded water quality, and reduced eelgrass and kelp habitats in many areas of Puget Sound. Future non-federal actions and climate change are likely to increase and continue acting against the quality of PS/GB bocaccio critical habitat. The intensity of those influences is uncertain, as is the degree to which those impacts may be tempered by adoption of more environmentally acceptable practices, restoration activities, and efforts to address the effects of climate change.

The PBF for PS/GB bocaccio critical habitat in the action area is limited to nearshore settlement habitats with sand, rock, and/or cobble substrates that also support kelp. The site attributes of that PBF that will be affected by the action are limited to prey quantity, quality, and availability, and water quality and sufficient DO to support individual growth, survival, reproduction, and feeding opportunities. As described above, the environmental conditions within the action area have been moderately degraded by past and ongoing human activity, but remains supportive of PS/GB

bocaccio. Eelgrass is present within 25 feet of Pier 1, which provides cover and forage for juvenile PS/GB bocaccio.

The proposed action will cause minor episodic ephemeral effects on water quality and DO, and long term minor effects on forage. The proposed action will not affect kelp per se, but will maintain long-term minor effects on eelgrass, which is a habitat type also utilized by juvenile bocaccio in nearshore habitats. During construction, the proposed action will cause brief minor impacts on water quality, including slightly reduced DO and increased TSS within about 300 feet of the site. The proposed action will cause no measurable changes in availability of forage resources, but may slightly increase prey contamination within about 300 feet of the site for a low number of years. The proposed action will also cause long-term beneficial effects on water and sediment quality by removing creosote-treated piles, the source of PAH contamination at the site.

The proposed action will extend the life of an overwater structure (Pier 1) that will keep certain habitat conditions at slightly reduced functional levels as compared to undisturbed areas. However, based on the best available information, the scale of the proposed action's effects, when considered in combination with the degraded baseline, cumulative effects, and the impacts of climate change, will be too small to cause any detectable long-term negative changes in the quality or functionality of the nearshore settlement PBF in the action area. Therefore, this critical habitat will maintain its current level of functionality, and retain its current ability for PBF to become functionally established, to serve the intended conservation role for PS/GB bocaccio.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of PS Chinook salmon, PS steelhead, PS/GB yelloweye rockfish and PS/GB bocaccio, nor is it likely to destroy or adversely modify designated critical habitat for PS Chinook salmon and PS/GB bocaccio.

2.9. Incidental Take Statement

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

2.9.1. Amount or Extent of Take

In the biological opinion, we determined the proposed action is reasonably certain to cause incidental take of listed fish:

Harm of PS Chinook salmon from
- exposure to noise from pile extraction and driving,
- contaminated forage,
- altered migratory behaviors,
- structure-related predation, and
- structure-related propeller wash.

Harm of PS steelhead from
- exposure to noise from pile extraction and driving, and
- structure-related propeller wash.

Harm of PS/GB bocaccio from
- exposure to noise from pile extraction and driving,
- contaminated forage, and
- structure-related propeller wash.

Harm of PS/GB yelloweye rockfish from
- structure-related propeller wash.

The distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Therefore, we cannot predict with meaningful accuracy the number of juvenile and adult Chinook salmon, juvenile and adult steelhead, and juvenile bocaccio that are reasonably certain to be injured or killed by exposure to any of these stressors. Additionally, NMFS knows of no device or practicable technique that would yield reliable counts of individuals that experience these impacts. In such circumstances, NMFS uses the causal link established between the activity and the likely extent and duration of changes in habitat conditions to describe the extent of take as a numerical level of habitat disturbance. The most appropriate surrogates for take are action-related parameters that are directly related to the magnitude of the expected take.

Noise from Pile Extraction and Driving

For take resulting from noise, we use the geographic extent of noise as a habitat surrogate. This surrogate is proportional to the amount of take, because we expect an increased number of individuals exposed to project-related noise with increasing geographic extent of the noise. The

take represented by this surrogate is equivalent to the maximum amount of take considered in our jeopardy analysis. Therefore, if the surrogate is exceeded, reinitiation of consultation will be required. This surrogate will function as an effective reinitiation trigger, because the extent of noise can be can and will be measured and reported.

Increased Suspended Sediment and Contaminated Forage

For increased suspended sediment and PAH exposure, the best available indicator for the extent of take is the extent of visible increased turbidity. Based on past projects (Bloch 2010), the observed extent of turbidity is a reliable indicator of the extent of elevated suspended sediment, and therefore, the extent of exposure of to listed species. Because PAHs will be released during activities that increase suspended sediment, the observed extent of turbidity is a reliable indicator of the extent of PAH exposure. Therefore, if the surrogate is exceeded, reinitiation of consultation will be required. This surrogate will function as an effective reinitiation trigger, because the extent of visible turbidity can be can and will be measured and reported.

Altered Migratory Behaviors, Predation, and Propeller Wash

For take resulting from the overwater structure, we use the square footage of overwater cover as a habitat surrogate. This surrogate is proportional to the amount of take, because we expect migration delays, additional vulnerability to predators, and additional vessel activity and associated propeller wash with increasing coverage of the water's surface. The take represented by this surrogate is equivalent to the maximum amount of take considered in our jeopardy analysis. Therefore, if the surrogate is exceeded, reinitiation of consultation will be required. This surrogate will function as an effective reinitiation trigger because the area of overwater cover can and will be measured and reported.

In summary, the extent of take for this action is defined as:

1. PS Chinook salmon:
    1.1 Geographic extent of underwater noise;
    1.2 Geographic extent of visible turbidity; and
    1.3 Area of overwater cover.

2. PS steelhead:
    2.1 Geographic extent of underwater noise; and
    2.2 Area of overwater cover.

3. PS/GB bocaccio:
    3.1 Geographic extent of underwater noise;
    3.2 Geographic extent of visible turbidity; and
    3.3 Area of overwater cover

4. PS/GB yelloweye rockfish:
    4.1 Area of overwater cover.

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 (Section 2.7).

2.9.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). NMFs believes that the full application of the reasonable and prudent measures described below is necessary and appropriate to minimize the likelihood of incidental take of ESA-listed species.

The Corps shall:

1. Implement monitoring and reporting to confirm that the take exemption for the proposed action is not exceeded.

2.9.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The Corps or any applicant has a continuing duty to monitor the 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.

To implement RPM Number 1, implement a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, the Corps shall require the applicant to collect and report details about the take of listed species. That plan shall:

1. Require the contractor to maintain and submit construction logs to verify that all take indicators are monitored and reported. The logs should indicate:
    - 1.1 A maximum of 12 days of vibratory pile extraction and installation combined;
    - 1.2 A maximum of 90 minutes of vibratory pile extraction and installation per day;
    - 1.3 Vibratory extraction of a maximum of 55 timber piles;
    - 1.4 A maximum of 12 days of impact pile installation/proofing;
    - 1.5 A maximum of 2,000 pile strikes per day;
    - 1.6 A maximum of 90 minutes of impact pile installation/proofing per day.
    - 1.7 A visible turbidity plume not to exceed 300 feet from the project site during any portion of the project;
    - 1.8 Area of overwater cover at the project site remains at 30,810 square feet.

2. Submit an electronic post-construction report to NMFS within six months of project completion. Send the report to: projectreports.wcr@noaa.gov. Be sure to include the NMFS Tracking number for this project in the subject line: Attn: WCRO-2018-00128.

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).

1. The Corps should encourage the applicant to install clean capping material over substrates where contaminated sediments may settle out after pile extraction.
2. The Corps should encourage the applicant to develop a plan to reduce the environmental impacts of Pier 1. Suggested measures include:
    2.1 Instruct patrons about the importance of nearshore marine habitats at the site to migrating juvenile salmon and rearing juvenile rockfish;
    2.2 Require patrons to operate vessels at low speeds near the pier and other shallow shoreline areas;
    2.3 Require patrons to maintain and operate their vessels with the intent to reduce the potential for toxic chemicals to enter or remain in the water at the site; and
    2.4 Establish a system to prevent and/or remove litter and wastes from the area around the pier.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Corps' authorization of the Port of Anacortes Piling Repair and Replacement Project in Anacortes, Washington. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12. "Not Likely to Adversely Affect" Determinations

This concurrence was prepared pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402 and agency guidance for preparation of letters of concurrence.

2.12.1. Southern Resident Killer Whale

The maximum distance of underwater noise from the proposed action is 735.6 meters (0.46 miles). This represents the distance from vibratory driving to the threshold for behavioral disruption, which was adjusted to 130 dB RMS given background noise levels in the area (Laughlin 2015). According to SRKW sightings from The Whale Museum (2014), no SRKW have been observed in the action area from 1990 to 2013. The closest recorded sightings were near Anacortes Ferry Terminal three miles southwest of the project site. Further, the Orca Network (2018) reports no SRKW or humpback whale sightings in the action area from April

2001 to November 2018. Given lack of sightings and high volume of marine traffic in the area (CH2M Rodino Inc. and Peterson Resources 2016), the presence of SRKW and humpback whales in the action area is extremely unlikely. Therefore, suspended sediment and noise are not likely to adversely affect SRKW and humpback whales.

Additionally, because the number of juvenile PS Chinook salmon that consume contaminated prey at the site would be very low, and because only a small subset of those individuals may be consumed by SRKW, the action is extremely unlikely to cause detectable levels of contaminants in SRKW. Therefore, the effects of contaminated forage on SRKW are discountable.

2.12.2. Southern Resident Killer Whale Critical Habitat

The proposed action is not likely to adversely affect critical habitat that has been designated for SRKW. We designated critical habitat for SRKW on November 29, 2006 (71 FR 69054). Critical habitat for SRKW includes marine waters of PS that are at least 20 feet deep.

The PBFs of SRKW critical habitat in the action area include:

- Water quality to support growth and development;
- Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth; and
- Passage conditions to allow for migration, resting, and foraging.

The proposed action will cause ephemeral minor effects on water quality. It will cause no measurable changes in water temperature and salinity. The presence of detectable levels of contaminants, including suspended sediments, will be ephemeral, infrequent, localized, and of such low concentrations that changes in water quality will be insignificant.

As discussed above, the proposed action will cause ephemeral minor effects on prey. The effects to Chinook salmon will not cause population-level effects that will measurably reduce SRKW forage. Therefore, effects to SRKW prey will be insignificant.

Detectable levels of construction-related noise will be limited to 0.46 miles to the east and west of the project site. As described above, SRKW do not use this area. Therefore, the action will cause insignificant effects on this PBF.

NMFS concurs with the Corps' determination that the proposed action is not likely to adversely affect humpback whales or SRKW and their designated critical habitat.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or

injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific Coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The proposed action and action area for this consultation are described in Sections 1 and 2 of this document. The action area includes areas designated as EFH for various life-history stages of Pacific coast groundfish, coastal pelagic species, and Pacific coast salmon. The PFMC described and identified EFH for Pacific Coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Pacific Coast salmon (PFMC 2014). The action area is not designated as a habitat area of particular concern (HAPC).

3.2. Adverse Effects on Essential Fish Habitat

The ESA portion of this document describes the adverse effects of this proposed action on ESA-listed species and critical habitat, and is relevant to the effects on EFH for Pacific coast groundfish, coastal pelagic species, and Pacific coast salmon. Based on the analysis of effects presented in Section 2.5, the proposed action will cause small-scale adverse effects on this EFH through direct or indirect physical, chemical, or biological alteration of the water or substrate, and through alteration of benthic communities, and the reduction in prey availability. Therefore, we have determined that the proposed action would adversely affect the EFH identified above.

3.3. Essential Fish Habitat Conservation Recommendations

Fully implementing the EFH conservation recommendation below would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, approximately 9 acres of designated EFH for Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species.

1. To reduce adverse alteration of the physical, chemical, or biological characteristics of the water and substrate, the Corps shall require the applicant to implement the project and associated conservation measures as described in Section 1.3 of this Opinion, particularly:
    1.1 Install a full-depth silt curtain around pile extraction.

2. To reduce adverse alteration of benthic communities and reduction in prey availability, the Corps shall require the applicant to implement the project and associated conservation measures as described in Section 1.3 of this Opinion, particularly:
    2.1 Ensure that barges or other structures do not ground out on the bottom.

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 users of this opinion is the Corps. Other interested users could include other Puget Sound ports and the citizens of Anacortes, Washington. Individual copies of this opinion were provided to the Corps. 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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