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

Refer to NMFS No:
WCRO-2019-00137

May 2, 2019

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

Re: Reinitiation of Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Port of Everett Maintenance Activities Project, Snohomish County, Washington (Lower Snohomish River 6th Field HUC 171100110201)

Dear Ms. Walker:

Thank you for your email we received on March 26, 2019, requesting reinitiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the U.S. Army Corps of Engineers' (COE) proposed issuance of a permit for the Port of Everett Maintenance Activities Project. The original opinion was issued on March 11, 2019 (NMFS Tracking Number: WCR-2018-10097). After the Opinion was issued, the applicant (Port of Everett) provided an additional summary of float calculations which differed from what was originally provided to NMFS and reviewed during our drafting of the Opinion. Because incidental take in that Opinion was based on the original number of floats, reinitiation was triggered.

In this opinion, which replaces WCR-2018-10097, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook (*Oncorhynchus tshawytscha*), PS steelhead (O. mykiss), or result in the destruction or adverse modification of PS Chinook salmon critical habitat. This document also serves to document our concurrence that the proposed action is not likely to adversely affect Georgia Basin (GB) bocaccio (*Sebastes paucispinus*) rockfish, GB yelloweye (*Sebastes ruberrimus*) rockfish, or SR killer whales (*Orcinus orca*).

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

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

Please contact Shandra O'Haleck of the Oregon/Washington Coastal Area Office at (360) 753-9533, or by email at Shandra.OHaleck@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

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

cc: Katie Heard, U.S. Army Corps of Engineers
Laura Gurley, Port of Everett

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

Port of Everett Maintenance Activities Project
Snohomish County, Washington
(Lower Snohomish River 6th Field HUC 171100110201)

NMFS Consultation Number: WCRO-2019-00137

Action Agency: Seattle District U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Puget Sound Chinook salmon *(Oncorhynchus tshawytscha)*	Threatened	Yes	No	Yes	No
Puget Sound Steelhead (*O. mykiss*)	Threatened	Yes	NA	NA	NA
PS/Georgian Basin yelloweye rockfish (*Sebastes ruberrimus*)	Threatened	No	NA	NA	NA
PS/Georgian Basin bocaccio (*S. paucispinus*) rockfish	Endangered	No	NA	NA	NA
Southern Resident Killer whale (*Orcinus orca*)	Endangered	No	NA	NA	NA

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

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

Issued By:

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

Date: May 2, 2019

TABLE OF CONTENTS

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 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

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

1.2 Consultation History

This biological opinion is based on the information provided in the September 2017, Programmatic Maintenance and Repairs biological evaluation (BE), numerous project clarifications, and emails. Consultation was requested by the U.S. Army Corps of Engineers (COE) on June 19, 2018. On July 25, the Port of Everett held a conference call with NMFS and U.S. Fish and Wildlife Service in response to questions the Fish and Wildlife Service had asked on July 6, 2018. NMFS received clarifying information from that conference call on August 9, 2018. On August 29, 2018, NMFS requested information on coffer dam dimensions. On October 15, 2018 NMFS received the information necessary to complete consultation, on which date NMFS initiated consultation.

The NMFS originally issued an opinion for this project on March 11, 2019 (NMFS tracking number: WCR-2018-10097). On March 21, 2019, NMFS participated in a conference call with the COE and the Port to clarify items in the Opinion. Because the applicant provided an additional summary of float calculations which differed from what was originally in the Opinion, the incidental take statement was affected and reinitiation was required. On April 1, 2019, we initiated formal consultation. A complete record of this consultation is on file at the Oregon Washington Coastal Office located in Lacey, Washington.

The COE concluded that the proposed action is not likely to adversely affect Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*), PS steelhead (*O. mykiss),* Georgia Basin (GB) bocaccio (*Sebastes paucispinus*) rockfish, and/or GB yelloweye (*Sebastes ruberrimus*) rockfish or designated critical habitat for PS Chinook salmon. They also concluded that there would be no effect on Southern Resident (SR) killer whales (*Orcinus orca*).

Based on the potential for adverse effects from fish handling and the continuing effects from in-water structures, NMFS does not concur with the COE's determination that the proposed action is NLAA for PS Chinook salmon, PS steelhead, and for designated PS Chinook critical habitat. We also do not agree that there would be no effect for SR killer whales. We agree with a not likely to adversely affect for GB rockfish and for SR killer whales. There is no critical habitat designated in the action area for PS steelhead and GB rockfish. NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), and concluded that the action would adversely affect the EFH of Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species.

1.3 Proposed Federal Action

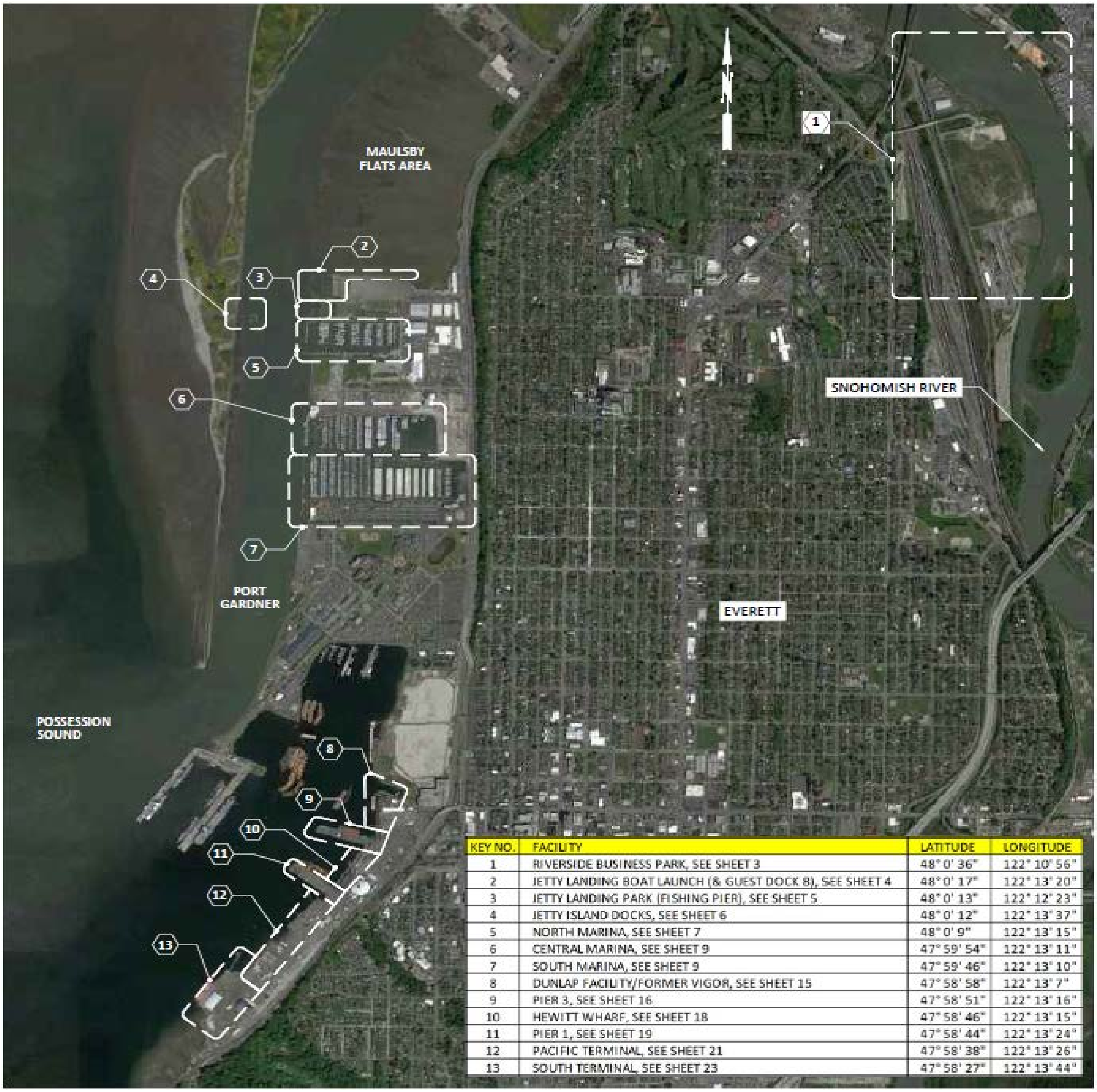
"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

The COE is proposing to permit the Port of Everett (Port) to conduct maintenance activities at 12 waterfront facilities (Figure 1). The Port's maintenance activities will consist of repair of aging structures (e.g., floats, piles, bulkheads, outfalls, wharves, boat launch, slope protection, and breakwaters), utilities, and retrofitting structures that do not currently meet the needs of the facility's customers (e.g., boat houses, floats, and a fuel dock will be reconfigured and some structures will be demolished). The tasks generally consist of repairs to existing serviceable facilities conducted within the existing footprint of the facilities with few environmental impacts. The 12 sites include:

- Jetty Landing Boat Launch and Guest Dock 8
- Jetty Landing Park (Fishing Pier)
- Jetty Island Docks
- North Marina
- Central Marina
- South Marina
- Dunlap Terminal (including repairs at the former Vigor site)
- Pier 3
- Hewitt Wharf
- Pier 1
- Pacific Terminal
- South Terminal

The proposed work also includes mitigation opportunities that will be completed as needed for any maintenance activities that may cause a greater effect to the environment (such as expanding over water coverage, larger benthic footprint, etc.). The potential mitigation activities include removal of timber piles near the Jetty Island Docks, cleanup of debris below the Mean Higher-High Water (MHHW) near Pier 3, removal of select piers, a timber float, and a gangway structure.

The purpose of the maintenance and repair program is to conduct needed maintenance, repair, and replacement of portions of existing Port structures over time to maintain the function and structural integrity of piers, pier structures (e.g., fenders, etc.), dolphins, bulkheads, docks, and boat ramps. The Port's facilities are subject to normal wear and tear and weather and vessel-related damage. As a result, routine maintenance of their facilities is needed.



KEY NO.	FACILITY	LATITUDE	LONGITUDE
1	RIVERSIDE BUSINESS PARK, SEE SHEET 3	48° 0' 36"	122° 10' 56"
2	JETTY LANDING BOAT LAUNCH (& GUEST DOCK 8), SEE SHEET 4	48° 0' 17"	122° 13' 20"
3	JETTY LANDING PARK (FISHING PIER), SEE SHEET 5	48° 0' 13"	122° 12' 23"
4	JETTY ISLAND DOCKS, SEE SHEET 6	48° 0' 12"	122° 13' 37"
5	NORTH MARINA, SEE SHEET 7	48° 0' 9"	122° 13' 15"
6	CENTRAL MARINA, SEE SHEET 9	47° 59' 54"	122° 13' 11"
7	SOUTH MARINA, SEE SHEET 9	47° 59' 46"	122° 13' 10"
8	DUNLAP FACILITY/FORMER VIGOR, SEE SHEET 15	47° 58' 58"	122° 13' 7"
9	PIER 3, SEE SHEET 16	47° 58' 51"	122° 13' 16"
10	HEWITT WHARF, SEE SHEET 18	47° 58' 46"	122° 13' 15"
11	PIER 1, SEE SHEET 19	47° 58' 44"	122° 13' 24"
12	PACIFIC TERMINAL, SEE SHEET 21	47° 58' 38"	122° 13' 26"
13	SOUTH TERMINAL, SEE SHEET 23	47° 58' 27"	122° 13' 44"

Figure 1. Vicinity Map.

1.3.1 Compliance

The Port will submit an Annual Planning and Compliance Form (Appendix A) to document completed repair work and describe the anticipated activities for the following year. Mitigation requirements/activities completed for the previous year's work and associated with upcoming work will be described as appropriate in the annual report.

1.3.2 Proposed Actions

Demolition and Pile Removal
Demolition activities associated with the project, including pile removal and demolition of floats, piers, and covered moorage structures. These activities will be completed within the approved work window (July 16 – February 15). Certain activities may be conducted outside the work window if they can be completed "in the dry;" for example, piling removal at low tide.

Piles will be removed by vibratory extraction or by pulling them directly with a crane. If a pile breaks during extraction, it will be cut off at mudline and/or pushed into the sediment and, if necessary, the hole will be filled with clean sand consistent with agency-approved best management practices (BMPs).

BMPs will be implemented throughout the project to minimize the potential for any water quality impacts during removal of creosote-treated timber elements and/or contaminated sediment from known Washington State Model Toxics Control Act (MTCA) sites. A containment boom will be deployed to capture any possible release of creosote, sawdust, or other construction debris generated during decking and piling removal.

Pile Installation
Piles will be installed using vibratory and/or impact hammers operated from either the existing pier structures, from land, or from a barge depending on the project location and equipment access restrictions. Concrete piles will be installed with an impact hammer only. Steel pile will only be vibratory driven unless they can be driven in the "dry" when the tide is out. All in-water pile installation will be conducted during the approved in-water work window (16 July to 15 February). Work on piles in the dry will be performed year-round.

Test pile programs, if used, will follow the same methodology of installation. The removal of all test piles will be completed with a vibratory hammer. Riprap may need to be temporarily removed and replaced to install test piles if needed. No additional riprap will be placed in test pile locations if temporary removal is necessary.

Geotechnical/Sediment Sampling Investigations
Geotechnical investigations will be completed, if needed, using typical drilling methods (i.e., hollow stem auger, mod rotary, sonic drilling, and/or cone penetrometer tests) as described below. A maximum of 100 geotechnical borings and/or sediment sampling cores/grab samples to be completed over the duration of the permit.

Standard Penetration Tests

Standard penetration tests will be performed using a split-barrel sampling tube with an approximately 2-inch outside diameter. The sampler is driven approximately 18 inches into the soil using a lightweight hammer. The hammer size is approximately 140 pounds and uses an approximately 30-inch stroke. The sampler is removed from the borehole and the split-barrel of the sampler is opened. The sample is then removed and stored for future analysis.

Cone Penetrometer Tests

Cone penetrometer test apparatus consists of an instrumented still cone having a tip facing down, with a usual apex angle of 60 degrees and cross section area of 40 square inches. The cone is attached to an internal steel rod that can run inside an outer hollow rod, which itself is attached to a sleeve. The test is performed by pushing the cone into the ground at a standard velocity while keeping the sleeve stationary.

Borehole/Sampling Completion

Each boring will be completed using a grout tube that will be inserted into the drill rods, and grout will be pumped into the hole to fill the borehole. The grout tube will be extracted from inside the rods, and the rods will be pulled out of the hole to the mudline. Freshwater will then be pumped down the casing to flush any grout off the casing or the drill rods. The final borehole will be grouted to just below the mudline and potable water will fill the hole from above the grout to the mudline. When this has been achieved, the casing will be pulled out of the hole. If the boring is being completed within a MTCA site, the applicable BMPs (see Attachment E to the JARPA) will be implemented.

Sediment Sampling

Sediment characterization samples will be collected as needed over the duration of the permit using either vibracore or clamshell sampling methods. Vibracores will be collected from a vessel outfitted for that purpose. Clamshell samples will be collected from a vessel with clamshell sampler and winch. The samples collected will be processed either onboard the vessel or onshore prior to submittal to an analytical laboratory for chemical analysis. Sediment sampling will only be completed as required.

NMFS analyzed the effects of encased geotech drilling/sediment sampling during consultation for SLOPES IV In-water Over-water Structures. In the Biological Opinion for that action (NMFS No. NWR-2011-5585; April 5, 2012), although the SLOPES IV Opinion only analyzed the effects within a river system, the level of effects that were analyzed are expected to be similar for fish in the marine/estuary environment. NMFS determined that geotech drilling and sediment sampling may be completed at any time of the year, as long as no adult fish are congregating for spawning and no redds are occupied by eggs or pre-emergent alevins within 300 feet of the work site. No spawning by ESA-listed species is expected to occur within the Port.

Boathouse and Float Removal/Reconfiguration

Select boathouses and floats in the Central Marina will be reconfigured to the South Marina. The Central Marina boathouses are supported by floats held in place by 12-inch-creosote-treated timber and 12-inch-diameter steel guide piles. For boathouse reconfiguration, the float guide piles will be removed to release each structure from its moorage. Boathouses will be floated to the South Marina where new 12-inch steel guide piles will be installed to moor the boathouses and floats. Boathouse reconfiguration will result in an increase in benthic habitat because of an overall reduction in mooring guide piles.

The existing overwater coverage will remain the same or will be reduced in the event of boathouse removal. The reconfiguration of the boathouses will benefit nearshore areas because the existing boathouse-and related overwater shading will be moved farther from the shoreline.

Breakwater Repair/Replacement
Existing timber breakwaters are in fair to poor condition and need repairs or replacement to continue functioning properly. Repairs will consist of replacing deteriorated elements with high-density polyethylene (HDPE) composite lumber or steel.

New breakwaters, where deemed more cost effective than repairs, will be constructed using either a steel sheet pile wall, pipe piles with infill panels, or pre-stressed, precast concrete piles spaced closely together to form a wall. Sheet piles and pipe piles will be driven with a vibratory hammer, and the solid concrete piles will be driven with an impact hammer. Replacement of a breakwater, including demolition and construction aspects, will occur during low tides to minimize in-water work.

Existing piles will be removed with a vibratory hammer. The vertical timber planks and horizontal timber wales will be removed and replaced with ammonia copper zinc arsenate (ACZA)-treated timber or HDPE composite lumber and galvanized hardware. Repairs to timber elements may include replacing timber pile protective caps. Most of the work will be performed from small skiffs or temporary floats or from the shore during low tide, supported by a barge-mounted crane.

Bulkhead Repairs
Bulkhead repairs address excessive lateral deflection of existing bulkheads or repairs to the bulkhead due to coating failure and corrosion. Bulkheads exhibiting excessive lateral deflection indicate an overloaded bulkhead and left unaddressed may result in bulkhead failure. To repair bulkheads with excessive lateral deflection, steel pipes will be driven in front of the bulkhead at a regular interval along the face of the bulkhead. Between the piles and the bulkhead, steel bracing will be installed to shoring the bulkhead and prevent additional deflection.

The protective coating system for the steel sheet pile wall bulkheads at multiple facilities are in need of repair to protect the steel from further corrosion. During repair of the protective coating system, structural elements with excessive corrosion will also be repaired, such as the steel wales. The failing coating system above MLLW will be removed mechanically using hand power tools and a new epoxy coating system applied either with a hand brush or a roller. Holes in sheet pile sections will be patched with welded plates and protected with an aquatic non-toxic epoxy coating system. A floating work platform and debris boom would be used to collect debris, as needed.

A cofferdam system will be incorporated for sheet pile bulkhead coating repairs below MLLW or to remove tide influence from repairs. The cofferdam will either extend down to mudline or be hung off the side of the existing bulkhead and contain an interior floor. The installation steps for a cofferdam that extends to mudline include the following:

- Temporarily relocate obstructions or riprap at mudline, and vibratory installation of uncoated, temporary steel sheet piles.
- Attach temporary bracing between the temporary sheet pile wall and the existing bulkhead with underwater welding.
- Seal cofferdam to bulkhead by welding and installation of rubber gaskets, remove trapped fish (possibly with a net), dewater cofferdam annular space, and pump water directly into the bay.
- Install containment system in cofferdam to collect water and debris from construction activities.
- Maintain constant dewatering. After initial dewatering the water will need to be treated (pumped topside to a truck or a holding tank).
- Clean existing steel sheet pile wall (removal of marine growth, corrosion, and loose materials by high pressure water jittering or mechanical abrasion) and install cathodic protection system.
- Recoat steel with a high-performance epoxy coating system using a roller/brush.
- Clean cofferdam, remove containment system, and flood annular space.
- Remove internal bracing and temporary sheet pile wall (burn off braces underwater with a torch and pull sheets with a vibratory hammer).
- Patch areas of wall that had bracing/wall welded to it with an underwater epoxy compound.

A hung cofferdam system consists of a prefabricated cofferdam unit, including the exterior wall, internal bracing, and a floor. The cofferdam is hung from the top of the existing bulkhead and sealed to the existing sheet piles in a manner similar to the sheet pile cofferdam. After the cofferdam is installed, the dam is dewatered and bulkhead repairs are performed. The floor of the cofferdam functions as the containment system and repairs to the existing bulkhead are made in a fashion similar to the sheet pile cofferdam system. After the bulkhead repairs are made the cofferdam is cleaned, flooded, and moved to the next section of bulkhead.

Covered Moorage Repair/Demolition
Portions or all of the covered moorage at the South Marina may be removed or repaired during the permit period. Covered moorage repairs will focus on the roof and support posts that support the roof. Roofing will be repaired or replaced. Frame repairs will consist of coating repairs, select replacement of structural steel elements, and replacement of fasteners. Existing coating will be mechanically cleaned and recoated with a high-performance coating system. Structural elements will be removed by mechanical or torch cutting and new, pre-coated elements will be installed with galvanized fasteners or welding. All work will be performed above water and use a containment system built off the existing floats to prevent construction debris from entering the water. No increase in overwater coverage will occur.

The covered moorage, including the roofing and supporting frames, will be removed in some instances. The covered moorage will be removed using a small crane, floats, and skiffs to dismantle the covered moorage. Relocation of the covered moorage to the upland for disassembly is not practical because of the large contiguous nature of the covered moorage. Removal of the covered moorage will be completed using a float-supported containment system similar to the covered moorage repairs.

Fender System Repair
The fender systems at the Port are in need of repair because of age and damage from vessels. Above-water repairs may include replacing individual timber wale and chock elements and hardware; replacing rubber fenders; and repairing damaged hardware, such as chains, strapping, and ultra-high-molecular-weight (UHMW) rub panels. New timber elements will be ACZA treated, replacement hardware will be hot-dipped galvanized or stainless steel, and new steel elements will be hot-dipped galvanized or coated with a high-performance coating system. Repair work will be done from work floats or the structure deck for smaller repairs. A floating crane may be used for replacing larger elements, such as steel wales.

Float Repair/Replacement
The floats at the project site are typically composed of modular precast concrete units with an expanded polystyrene (EPS) Styrofoam interior, and an exterior timber wale system on the perimeter to connect the units together. Float replacement will not result in a net increase in overwater coverage.

Float repair/replacement activities and include the following:

- Float units with extensive damage and deterioration will be replaced with new prefabricated concrete floats that are delivered to the site either by water or truck. Float replacement is conducted by disassembling the wale system, floating in/out the damaged float unit, floating in the new unit, and reconnecting the wale system.
- Utility connections will be disassembled and reconnected as needed.
- Remove damaged wale elements and replace with ACZA-treated timber or HDPE. The new wale elements will match the dimensions of the elements they replace.
- Replace (in-kind) damaged or missing mooring hardware (typically consisting of small steel or cast-iron cleats bolted to the top of the floats).
- Replace UHMW polyethylene rub strips on the guide pile collars or replace entirely with steel collars.
- Replace timber decking in-kind with ACZA-treated timber. All other non-decking timber elements will be replaced with ACZA-treated timber elements. Larger scale decking replacement (greater than 250 square feet or 33 percent of overall decking area) will be made with a fiberglass grating that will provide a minimum 60 percent open surface for light penetration.
- Repair cracks in concrete floats (both above and below water) with a surface-applied, epoxy mastic repair material. Larger concrete spalls will be built up through the trowel application of a high performance cementitious repair material. Repair listing floats by attaching rectangular UHMW polyethylene tubs filled with EPS to the bottom of the float. Floats must be cleaned/scraped prior to placement of tubs.

Replacement of the wale systems, mooring hardware, and guide pile collars will be done above water and all field cutting of treated timber will be performed upland. Steel elements will either be hot-dip galvanized or coated with a high-performance coating system.

Float Relocation/Removal

Marina floats may be reconfigured or removed to address changes in the marina industry and to provide a safer marina. Marina floats will be reconfigured to provide better navigation within the marina and reduce the potential for vessels to collide with floats, or to provide more in demand slip sizes. Locations, such as the fuel dock within the Central Marina, will be reconfigured to provide better access to boaters. The overall overwater coverage of floats will be maintained or decreased, and the number and area of guide piles will also be maintained or reduced.

Outfall Repair

The Port's existing outfalls experience damage from floating debris impact, corrosion, and migration of outfall foundation material. Damaged Port outfalls will be repaired in the dry to the extent possible, during low tide if applicable. Repairs will consist of replacing the pipe section near the outfall, repairing or replacing tide-flex valves, slip-lining, and/or reconstructing the outfall. Riprap near outfalls will be removed and replaced to facilitate outfall repairs and the extent of existing riprap will not be increased. All work is only intended to keep the existing system functioning at the end of the pipe. No repairs will be performed to the stormwater vaults or conveyance system. Excavators or small cranes may be used to lift and place pipe sections and remove and replace riprap. Some outfalls are open-ended pipes and have damaged grates needing replacement. Grates will be welded or fastened to the pipe end. Repairs to outfalls will be local in nature and will not increase the rate or quantity of discharge nor change the outfall pipe diameter.

Boat Launch Ramp Repairs

Boat launch concrete ramp slabs with major to severe cracking will be demolished in the dry during low tide to the extent feasible using small excavators and hydraulic breakers. All concrete debris will be removed prior to being submerged by the incoming tide. Concrete portions of the ramps below MLLW that are still submerged during low tide will be picked out of the water for demolition in the dry. After demolition of the existing concrete, the bearing surface will be supplemented with clean, compacted shoulder ballast (gravel) and leveled. The ramp driving surface will be reconstructed with precast concrete planks or panels supported by steel links and/or a steel frame. The concrete panels or planks will be set by an upland crane and no uncured concrete will be placed below the ordinary high water mark (OHWM).

For repair to the boat ramp between mean sea level and MHHW where cast-in-place concrete or flowable grout is to be used, a cofferdam may be used to perform the construction in the dry. The cofferdam will consist of a sandbag wall constructed in the dry (during low tide) on the lower portion of the existing boat launch surface. Because the construction of the sandbag coffer dam will be done in the dry, is unlikely fish will be stranded or adversely affected. All water used during cleaning or seepage into the work area would be pumped to a holding tank and treated. Upon completion of the repair work to the boat ramp, the cofferdam will be removed during low tide.

Pavement Repair/Replacement
Repairs to concrete paving above OHWM will include sealing cracks and filling spalls with flowable, high-strength, non-shrink grout or concrete. Repairs to asphalt paving above OHWM include resealing, sealing cracks, grinding, and repaving and asphalt patching. No uncured grout or concrete will be allowed to come into contact with the water for these repairs. Any on- or in-deck work requires scuppers to be blocked as a BMP.

Pier Repairs (Public)
This section addresses miscellaneous above OHWM repairs at the Jetty Landing Park pier, Travelift Dock, Americans with Disabilities (ADA) Dock, and nearshore access piers at the marinas.

Pier repairs at the Jetty Landing Park are anticipated for the timber deck framing, decking, and guardrail system. The structural deck framing will be placed in-kind with ACZA-treated timber or steel. Select timber decking boards will be replaced with ACZA-treated timber. If an extensive area of decking (greater than 250 square feet or 33 percent of overall decking area) needs to be replaced, steel or fiberglass grating will be installed with a light-permitting area greater than 60 percent. Repairs to the timber and steel guardrail system will be made with in-kind materials. All repairs anticipated for the Jetty Landing Park will be performed from shore or the pier, using hand tools and possibly a shore- or barge-mounted crane.

The steel plates along the Travelift Dock slip have failed and need to be replaced. The concrete around the steel plate embeds has spalled and the plates are loose. To remove the existing plates, an air-powered chipping hammer will be used to expose and remove the existing steel embeds and prepare the existing concrete for replacement embed plates. Prior to demolition, a containment system will be installed to ensure all concrete debris is collected and prevented from entering the water. New steel plate embeds will be installed and watertight concrete forms will reform the side of the finger pier (in the location of the embed) in preparation for concrete placement. Concrete will be placed from above, likely via five-gallon buckets because of the small quantity.

The ADA Dock deck structure is framed with treated timber and concrete. It is anticipated that select timber structural elements and/or timber decking will need to be replaced over the life of the permit because of deterioration or damage. Structural timber elements, such as pile caps or stringer, will be replaced from below the dock by laborers working on floats or scaffolding. Timber elements will be replaced with ACZA-treated timber. Select timber decking will also be replaced with ACZA-treated timber.

In general, the access piers at the marinas are in good condition and no significant repairs are anticipated over the course of the permit time frame. However, piers have experienced unanticipated damage, such as vessels colliding with pier-supported gangways. Therefore, provision for a small number of gangway replacements are included in the permit. Gangways will be replaced with a shore-mounted crane unless inaccessible where a barge-mounted crane may be necessary.

Pile Repair
Pile repairs will vary, depending on the material type of the pile, and will be made above and below water to guide piles, fender piles, and structural piles. Pile repairs using a pile jacket are described in the following section.

Concrete pile repairs will include (1) installing pile jackets to repair damaged or deteriorating sections of the pile or to repair loss of concrete clear cover; and (2) applying epoxy-patching compound for repairing spalls and cracks. The epoxy is a solid, two-part putty compound that is mix by hand and applied to the surface by hand. Surface preparation is minimal and does not require abrasive blasting.

Repairs to steel piles will include pile jacketing, new coating to repair large areas of damaged coating and epoxy patching compound to repair small areas of damaged coating. Before applying the new coating, the surface of the steel will likely be cleaned mechanically with abrasive bristled power tool to remove corrosion, loose rust, and debris, all of which will be collected to prevent contact with the water. Once clean, the surface will be washed to remove chlorides prior to applying a polyamide epoxy resin coating system by brush or roller. For small areas of damaged coating repair, an epoxy patching compound identical to that described for concrete piles will be used, which requires minimal surface preparation. Cathodic protection may also be installed to protect steel features from future corrosion.

Pile Jacket Installation
Pile jackets will be used for some concrete and steel pile repairs. The following summarizes how these repairs will be completed.

Concrete Piles
Divers will first remove marine growth, any lose debris, and corroded reinforcing steel using underwater, pneumatic, hand-held power tools prior to installing pile jackets on concrete piles. Debris will be collected at mudline using a collection basket. Supplemental reinforcing steel will be installed by divers prior to installation of a two-piece, stay-in-place fiberglass jacket. Once the jacket is secured in place, grout will be pumped into the jacket annular space through valved ports from the bottom up, displacing the saltwater in the annular space. The grout will be contained within hoses with valves to prevent accidental release into the water. A hand-applied epoxy material will be used to seal the top of the jacket to prevent the grout from contacting the water. Any mudline material displaced for the jacket installation will be replaced by divers. Concrete pile jacket installation will increase the pile radius by approximately 6 inches, which will involve mitigation for the associated decrease of benthic habitat.

Steel Piles
Divers will first remove marine growth and any lose debris from the surface of the pile for steel pile jacket installation. Any low spots in the pile surface will be leveled out with an underwater mastic applied by hand. Divers will then apply a petrolatum tape to the pile surface. Once the pile is wrapped with the tape, a two-piece HDPE protective wrap will be installed with stainless steel bolts to protect the tape material. The bolts will be tightened by divers with hand tools.

Steel pile jackets will increase the pile radius by approximately 1 inch.

Pile Replacement

Guide piles that are damaged or deteriorated beyond repair will be removed and replaced. Pile removal will occur by direct pull or with a vibrating hammer using the minimum energy necessary to extract the pile. Equipment used to remove piles will vary depending on pile location, but will likely involve floating cranes and vibratory hammers. Replacement guide piles will consist of steel pipe piles matching the diameter of the pile they are replacing. Piles will be galvanized or coated with a high-performance coating system and installed with a vibratory hammer only.

Vertical load bearing piles, referred to as structural piles, will be removed by direct pull or with a vibrating hammer using the minimum energy necessary to extract the pile. Replacement structural piles will consist of steel pipe piles matching the diameter of the pile they are replacing. Piles will be galvanized or coated with a high-performance coating system and will be only installed with a vibratory hammer. The majority of timber piles (more that 80 percent) to be replaced are treated with creosote.

The deck structure will be demolished to access the damaged pile(s) to replace below-deck structural bearing piles. The localized demolition will be completed from on deck and all demolished materials will be prevented from entering the water as practicable. Any debris that falls into the water will be collected and disposed at an upland disposal facility.

Fender piles that are damaged or deteriorated will be removed by direct pull or with a vibrating hammer using the minimum energy necessary to extract the pile. Replacement fender piles will consist of steel pipe piles matching the diameter of the pile they are replacing. Piles will be installed with a vibratory hammer only and galvanized or coated with a high-performance coating system and include an HDPE rub strip or partial sleeve in locations of potential abrasion.

The MTCA contaminated sediment sites overlap the following facilities: Central Marina, Dunlap, Pier 3, Hewitt Wharf, Pier 1, Pacific Terminal, and South Terminal. Pile replacement in these areas will be completed in accordance with the required BMPs for those sites (such as turbidity monitoring to ensure minimal sediment disturbance). Pile replacement will consist of pile removal, placement of clean sand on the substrate (to three times the diameter of the removed pile) in the footprint of the new pile prior to installation.

Table 1. Cumulative Quantities for Proposed Maintenance Activities

Page 1 of 1

PROJECT: Port of Everett Programmatic Maintenance and Repairs
PERMIT APPLICATION: NWS-2017-876
LOCATION: Everett, WA
DATE: 23 July 2018

TABLE 1 Supplement - CUMULATIVE QUANTITIES FOR PROGRAMMATIC MAINTENANCE ACTIVITIES			
ACTIVITY	**QTY**		**NOTES**
EXTRACTED PILES	898	EA	
TOTAL	**898**	**EA**	
REPLACEMENT PILES			Total replacement pile count may reduce if larger pile dia is used. Total area of replacement piles will not exceed area of existing piles.
TIMBER - 12 INCH	649	EA	
STEEL - 12 INCH	38	EA	
STEEL - 16 INCH	47	EA	
CONCRETE - VARIES	14	EA	Diameter unknown, replacement pile will not exceed existing diameter.
TOTAL	**748**	**EA**	
RELOCATED PILES			
TIMBER - 12 INCH	61	EA	
STEEL - 16 INCH	89	EA	
TOTAL	**150**	**EA**	
NEW PILES			
STEEL - 24 INCH	12	EA	For bulkhead repair
TOTAL	**12**	**EA**	
REPAIRED PILES			
STEEL - 12 INCH	6	EA	
STEEL - 20 INCH	84	EA	
CONCRETE - DIA VARIES	97	EA	
TOTAL	**187**	**EA**	
OVERWATER STRUCTURES REMOVED			
CONCRETE - FLOATS	109,760	SF	Assumes 8'x20' Concrete Floats (686 total)
COVERED MOORAGE (SOUTH MARINA)	236,700	SF	
TOTAL	**346,460**	**SF**	
OVERWATER STRUCTURES REPLACED			
FLOATS - CONCRETE	19,520	SF	Assumes 8'x20' Concrete Floats (122 total)
FLOATS - TIMBER	4,480	SF	Assumes 8'x20' Timber Floats (28 total)
ROOF REPAIR	150,000	SF	
TIMBER - PIER DECKING	920	SF	
GANGWAYS	3,200	SF	Assumes Average Gangway Size is 4'x50' (16 total)
BOAT HOUSES	128,500	SF	Replaced or Relocated
TOTAL	**306,620**	**SF**	
OVERWATER STRUCTURES REPAIRED			
FLOATS - CONCRETE	198,112	SF	Assumes 20% surface area of 8'x20' floats (6,191 total)
FLOATS - TIMBER	6,048	SF	Assumes 20% surface area of 8'x20' floats (189 total)
GANGWAYS	640	SF	Assumes 20% surface area of 4'x50' gangway (16 total)
TOTAL	**204,800**	**SF**	
EXCAVATION / MATERIALS REMOVED FROM SITE			
PILE REPAIRS	25	CY	
BULKHEAD REPAIRS	222	CY	
COFFERDAM INSTALLATION	93	CY	
OUTFALL REPAIRS	84	CY	
BOAT LAUNCH (CIP CONCRETE)	1,481	CY	
TOTAL	**1,906**	**CY**	
FILL MATERIAL PLACED			
PILE REPAIRS	25	CY	
SUPPLEMENTAL RIPRAP	4,885	CY	
BOAT LAUNCH (CIP CONCRETE)	1,481	CY	
BULKHEAD REPAIRS	222	CY	
COFFERDAM INSTALLATION	93	CY	
OUTFALL REPAIRS	84	CY	
TOTAL	**6391**	**CY**	

Note: Fill is for repairs to existing bank stabilization or existing structures to repair them to previously authorized levels.

Riprap Supplement
Riprap at multiple facilities is exhibiting minor erosion due to down-slope migration of the existing riprap. Riprap in these locations will be supplemented to prevent further erosion. No increase in coverage of riprap will occur below MHHW or OHWM. Riprap will be placed from above by an upland excavator or by a barge-mounted crane. Riprap stone will match the diameter of the existing riprap. If a habitat bench is present on the slope, the bench will be maintained with the repair and a layer of fish rock will be placed over the bench.

Utility Repair/Replacement
Utilities and associated hardware, such as utility hangers, pull boxes, light fixtures, conduit and piping, with damage or corrosion will be replaced or repaired. Repair activities also include securing loose electrical cables and replacing light fixtures. Utility repairs/replacement will be conducted with hand-held power tools above water from the floats, deck, and small work skiffs.

1.3.3 Facility Description and Proposed Repairs

The following section briefly describes the facilities, summarizes the existing conditions, and identifies the proposed maintenance activities at each facility. It is important to note that the exact type and quantity of maintenance activities that will need to be performed any given year is uncertain and the numbers and quantities provided in the table are upper estimates based on current conditions and the historical maintenance needs at the Port's facilities. Prior to each year's activities, the Port will provide more refined numbers via the annual planning and compliance form submittal. A summary of the actions is presented in Table 1, which follows this section.

Jetty Landing Boat Launch and Guest Dock 8
The Jetty Landing Boat Launch consists of 13 boat launch lanes and 7 floating docks (Figure 2). The launch lanes are oriented in an east-west direction with two lanes between every floating dock and one launch lane to the south of the southernmost dock. The driving lanes are composed of precast concrete planks in the intertidal zone and below. The ramps transition to asphalt above the Ordinary High Water Mark (OHWM). The floating docks are composed of both timber-framed and precast concrete floats. Both concrete and steel guide piles are used to moor the floats in place.

Repair and replacement activities proposed for the Jetty Landing Boat Launch and Guest Dock 8 facility will occur on the floats, pier, piles, riprap, paving, and utilities. Activities will include the repair and replacement of floats; replacement of gangways; repair of four concrete piling, replacement of 7, 16.5-inch concrete piles, replacement of 5, 12-inch timber fender piles with 12-inch steel piles; replacement of one 12-inch steel fender pile; replacement of one 16-inch steel guide pile; repair of up to 1,500 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; repair of boat ramp surfaces (patch and replace panels); and conduct miscellaneous utility repairs.

Figure 2. Jetty Landing Boat Launch and Guest Dock 8

Jetty Landing Park (Fishing Pier)

The Jetty Landing Park Fishing Pier consists of a timber and concrete framed pier and floating concrete dock connected to the pier by an aluminum gangway (Figure 3). The pier is approximately 140 feet long and 8 feet wide and is founded on nine precast, pre-stressed concrete piles. The piles support cast-in-place concrete pile caps. Timber stringers span between the pile caps and support the timber deck boards. The pier incorporates a timber guardrail system and a steel gangway provides access to the concrete fishing floats from the outboard end of the pier.

Proposed maintenance activities include repairs to the timber elements of the pier, repairs to the concrete floats, minor repairs to the utilities, and installation of supplemental riprap. These activities include the repair and replacement of floats; replacement of pier gangway and pier decking; repair of two concrete piles, replace two concrete guide piles in kind or with 16.5-inch steel piles; the repair up to 200 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; and conduct miscellaneous utility repairs.

Figure 3. Jetty Landing Park (Fishing Pier)

Jetty Island Dock

The Jetty Island Dock provides temporary recreational moorage and access to Jetty Island (Figure 4). The Jetty Island Dock consists of an access pier, concrete floats, and a steel gangway providing personnel access from the floats to the pier. The pier is approximately 185 feet long by 10 feet wide and is composed of four precast, pre-stressed concrete piles, cast-in-place pile caps, precast deck beams spanning between the pile caps, and a steel guardrail system. There are 51 concrete float units moored by 33 guide piles. A seasonal floating restroom is moored to eight timber piles during the spring and summer.

Anticipated maintenance activities at the Jetty Island Dock include repairs to floats and guide piles. It is also anticipated that repairs to the debris boom may be needed, including repair or replacement of dolphin structures. These activities include the repair and replacement of floats; replacement of e gangway; repair and replacement of components of the existing log boom; the repair of piling, replace one pile with a 16-inch steel or concrete pile, replace seven timber guide piles with 12-inch steel or concrete piles, and replace nine timber dolphin piles with 12-inch steel piles.

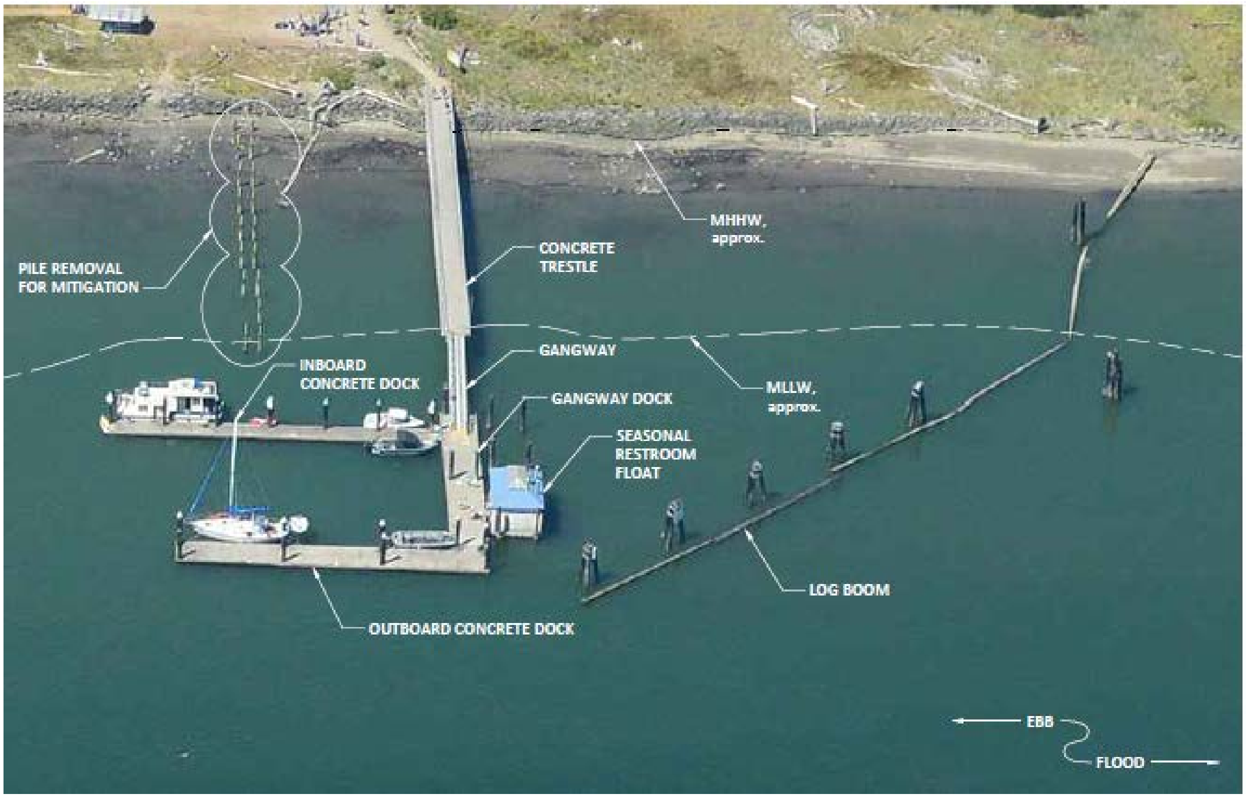


Figure 4. Jetty Island Dock

North Marina (including Travelift Pier)

The North Marina is composed of eight floating docks providing 156 slips for vessel moorage, a Travelift (haul-out) dock in the southeast corner of the marina, and a small boat haul-out dock in the northeast corner of the marina (Figure 5). The marina docks consist of 977 concrete floats moored in place by 321 guide piles. Five pile-supported piers provide access to the floating docks with aluminum gangway providing a transition from the piers to the floating docks. The access piers are supported by steel pipe piles and topped with a steel wide-flange pile cap.

The North Marina is relatively new and in good condition; therefore, limited repairs are anticipated over the next 10 years. Anticipated maintenance activities at the North Marina are float repair/replacement, pile replacement, utility repairs, outfall repairs, and pier repairs.

Anticipated repairs at the Travelift Dock are supplemental riprap, pier repairs (steel plate curb repair), float repair/replacement, pile repair/replacement, outfall repair, and pavement repair/replacement). These activities include the repair and replacement of floats; repair of two outfalls; replace pier gangways, railing, and hardware; repair concrete piling and replace five concrete guide piles with 16.5-inch steel or concrete piles, replace 22 steel guide piles with 16-inch steel or concrete piles, and replace seven timber guide piles with 12-inch steel or concrete piles; repair of up to 3,000 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; and conduct miscellaneous utility repairs.

Figure 5. North Marina (including Travelift Pier)

Central Marina (including Yacht Club and Seiner Pier)
The Central Marina has 11 floating docks (docks A through K) for moorage, including both private and Port-owned boathouses (Figure 6). The marina has more than 700 vessel slips ranging in size from 20 to 70 feet and end tie slips up to 96 feet long with power available to most of the slips. The Port plans to reconfigure the slips to create additional, larger slips. The reconfiguration will result in fewer slips and overall less shading than the existing configuration.

The marina also includes two breakwaters, two guest moorage docks, and a 360-foot-long public fuel dock. Overall the marina is composed of 1,707 floats moored in place by 849 guide piles. The marina also contains approximately 95 individual floating boathouses moored adjacent to marina floats and approximately 35 attached boathouses (G Dock). A steel sheet pile bulkhead extends along the north shore of the marina and contains approximately five outfalls.

The pier-supported yacht club building is in the northwest corner of the marina. The yacht club building piles are primarily timber piles; however, a few of the piles have been encased in steel jackets and filled with concrete at some point following the initial construction. The yacht club reciprocal float is a floating concrete dock, approximately 140 feet long and 5 feet wide, held in place by four timber guide piles. A 125-foot-long, vertical fixed timber breakwater is located immediately to the east of the yacht club building. The breakwater is composed of timber batter piles, plumb piles, and horizontal timber lagging that is secured to the piles with galvanized hardware.

The timber-framed Seiner Pier is centered between the Central and South Marina. The Seiner Pier is composed of a 600-foot-long and 12-foot-wide trestle that provides access to a 45- by 50-foot pier head. It has a total of 30 structural timber piles supporting the head of the pier and another 80 timber piles supporting the trestle. Lining the perimeter of the pier are 105 timber fender piles. There are 27 timber piles within the existing dolphins, 9 piles in each. Either all twenty-seven 12-inch timber piles will be replaced with twenty-seven 12-inch steel piles or every 9-pile dolphin (12-inch piles) will be replaced with a single 36-inch steel pile.

Anticipated activities at the Central Marina and Central Guest Dock 3 are float repair/or replacement, pile repair, pile replacement, utility repairs, pier repairs, bulkhead repairs, outfall repairs, breakwater repairs/replacement, float relocation/removal (Fuel Dock), and boathouse/float removal/reconfiguration. These activities include the removal/relocation of 128,500 square feet of boathouses and floats; repair of 185 linear feet of timber breakwater; replacement of 125 linear feet of timber breakwater with concrete or steel breakwater components; repair of 22,000 square feet of sheet pile wall coating; repair of floats, removal or reconfigure 159 concrete floats, replace 45 concrete floats in kind, and replace 11 timber floats with concrete floats; reconfigure the fuel dock; repair five outfalls; replace gangways; repair railing and hardware; replace 17 steel guide piles with 16-inch steel or concrete piles, replace 200 timber guide piles with 12-inch steel or concrete piles, replace and relocate61 timber piles with 12-inch steel piles, replace 27 timber fender piles with 12-inch to 36-inch steel piles, relocate 14 boathouse guide piles; and conduct miscellaneous utility repairs.

Figure 6. Central and South Marinas

South Marina (including Americans with Disabilities Act (ADA-Compliant Dock)

South Marina has 17 floating docks (A through Q) for moorage with both covered and uncovered slips available (Figure 6). The South Marina has more than 1,000 vessel slips ranging in size from 20 feet to 70 feet and end ties up to 96 feet. Utilities are available to most of these slips and varies based on dock. The covered moorage is provided by large contiguous roofs supported by steel frames and timber posts mounted to the floats. A floating concrete breakwater (South Guest Dock 1) protects the west side of the South Marina basin from waves generated in Possession Sound and supports guest moorage at the marina. South Guest Dock 1 is 960 feet in length and held in place by 38 timber guide pile pairs. A steel sheet pile bulkhead extends along the south shore of the marina.

The ADA Dock is located east of the South marina. The ADA Dock is composed of approximately 150 linear feet of a floating concrete dock, five gangways, and four intermediate floats. The gangways and floats are designed in such a way that slopes will not exceed the allowable limit defined by the ADA as the tide raises and lowers the gangway. Steel guide piles keep the floating units of the dock in place. The dock gangway is accessed by a timber wharf that ties into the existing grade of the shoreline. Timber decking tops the timber stringers that span between the steel pile caps. The wharf is supported on precast octagonal concrete piles.

Seventy-five piles will be removed from the Central Marina and relocated in the South Marina. Fourteen of the 75 piles are 16-inch-diameter steel piles and the other 61 piles are 12-inch timber guile piles from the Central Marina that will be relocated to the South Marina and replaced with 12-inch steel guide piles.

Anticipated activities at the South Marina and ADA Dock are float repair/ replacement, pile replacement, utility repairs, pier repairs, bulkhead repairs, outfall repairs, covered moorage repair/demolition, and boathouse removal/relocation. These activities include the boathouse relocation including relocating 75 steel guide piles (12-inch to 16-inch); the demolition of 236,700 square feet of moorage roofing and the repair/replacement of 150,000 square feet of roofing; repair of floats, replacement of 64 concrete floats, and removal of 527 floats if it is determined to be too costly to repair them; repair of 12 outfalls; replacement of pier gangways, railing, hardware, and 770 square feet of decking; replacement of damaged timber pier components; replacement of six 6steel piles with 16-inch steel or concrete piles, replace 173 timber piles with 12-inch steel or concrete piles; repair up to 3,000 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; and conduct miscellaneous utility repairs

Dunlap Terminal (including repairs at the former Vigor site)

The marine elements of Dunlap/former Vigor Terminal area include a steel sheet pile bulkhead, fender piles along the face of the bulkhead, concrete floats accessed from the bulkhead by a gangway and moored by guide piles, steel pile dolphins with timber fender units, a steel marine railway, and derelict open-deck finger pier (Figure 7).

Anticipated maintenance activities at the Dunlap Terminal are fender system repairs and pile repair/replacement. These activities include the replacement and repair of components on 40 linear feet of timber fender system; the replacement of gangways; replacement of two timber fender piles with 12-inch steel piles, replace nine steel piles with new 12-inch steel piles, repair six steel piles; and repair an outfall.

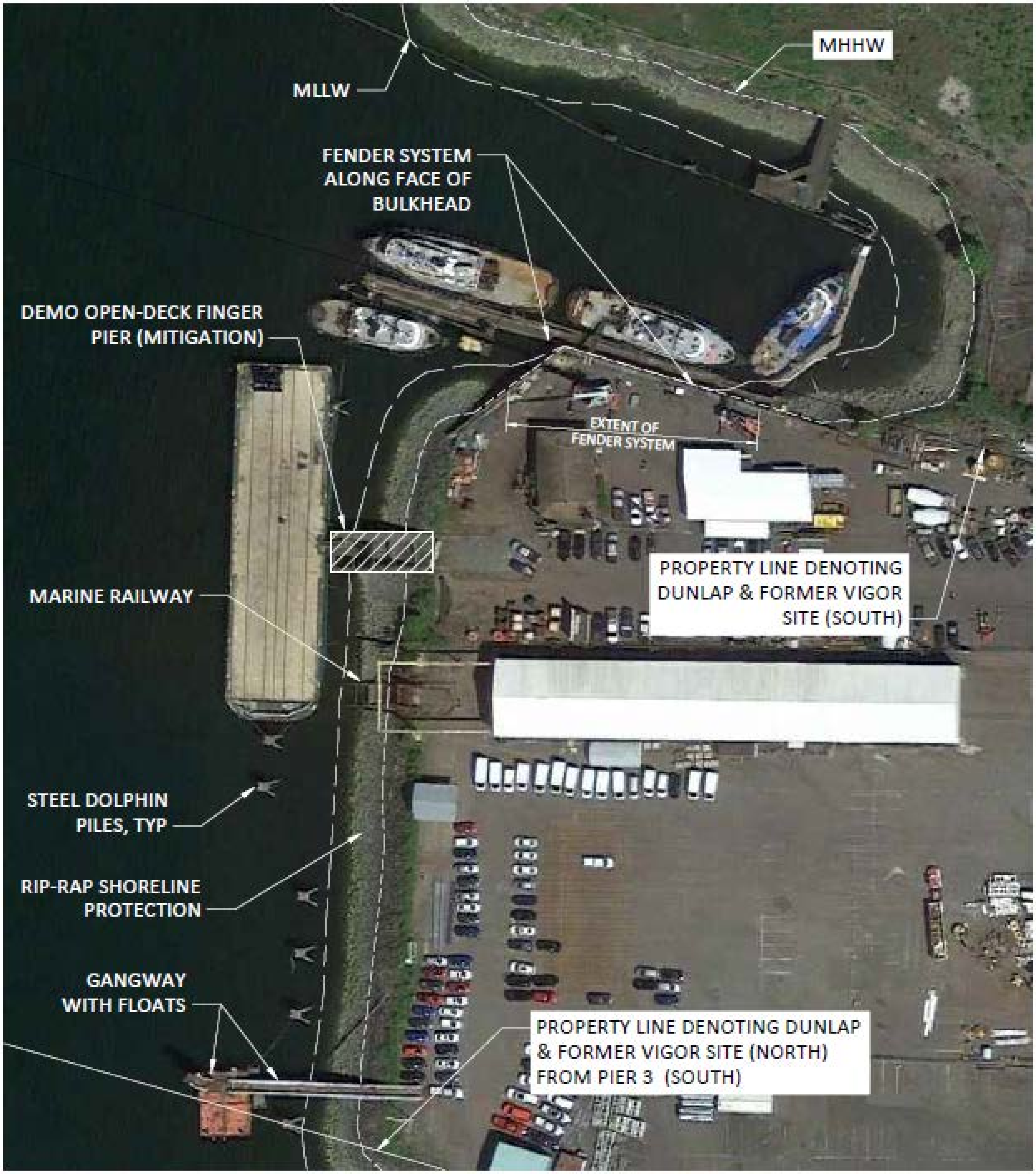


Figure 7. Dunlap Terminal (including repairs at the former Vigor site

Pier 3

Pier 3 is 750 feet long and 120 feet wide and is supported by 560 concrete structural piles and 130 steel structural piles (Figure 8). The deck structure of the pier is composed of cast-in-place concrete pile caps, precast concrete deck panels, and a concrete bullrail around the perimeter. Both berth faces and the outboard end of the pier are protected by a continuous fender system incorporating regularly spaced timber and steel fender piles. The deck of Pier 3 is paved with asphalt, and the pier utilities are routed within the ballasted pier deck. At the head of the pier, the shoreline is retained by a large sheet pile bulkhead below the pier. The sheet pile bulkhead continues to the southwest and transitions to the Hewitt Wharf. To the north, the sheet pile bulkhead turns 90 degrees and runs inland parallel to the north face of Pier 3.

Anticipated activities for Pier 3 include pile jackets (both steel and concrete piles), fender system repairs, pile repair/replacement, bulkhead repairs, interim bulkhead repair with new steel piles, outfall repairs, riprap supplement, utility repair/replacement (in-deck), and pavement repair/replacement. These activities include the repair of 4,200 linear feet of steel sheet pile bulkhead, the installation of 12 new 24-inch steel piles, repair of coating on over water portions of bulkhead; repair of 476 linear feet of fender system; repair one outfall; repair of 50 concrete piles using jackets, repair of 84 steel piles, replacement of 20 steel fender piles with 12-inch steel piles, replacement of 91 timber fender piles with 12-inch steel piles; repair of up to 200 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; and to conduct miscellaneous utility repairs.

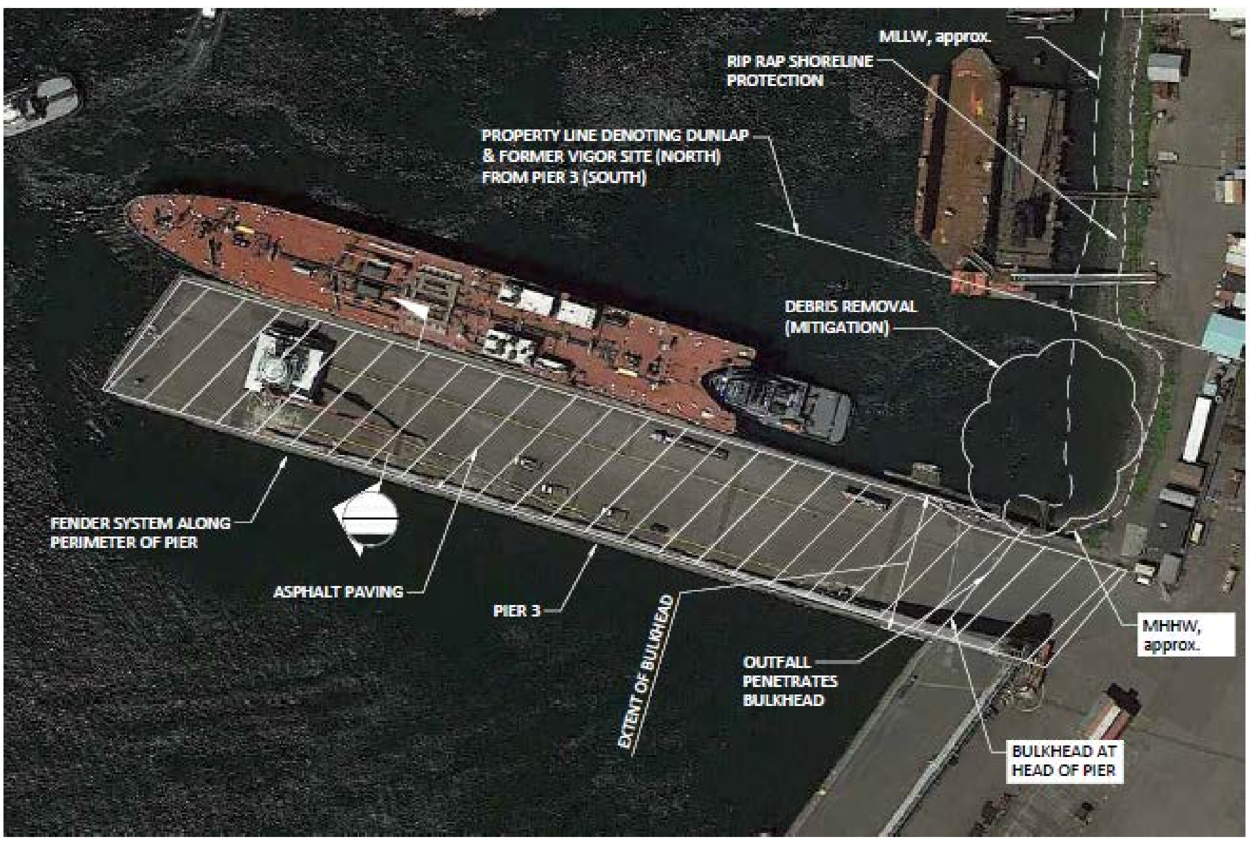


Figure 8. Pier 3

Hewitt Wharf

The Hewitt Wharf is a steel sheet pile bulkhead structure that extends from Pier 3 in the north to Pier 1 in the south (Figure 9). The bulkhead is 815 feet long, with a toe elevation of approximately -25 feet MLLW. The bulkhead is protected by a continuous fender system incorporating regularly spaced timber and steel fender piles. The bulkhead contains four outfalls of varying size. Portions of Hewitt Wharf may overlap a MTCA site; therefore, pile removal and replacement will be completed in accordance with the MTCA BMPs.

Anticipated activities for the Hewitt Wharf are bulkhead repairs (using a cofferdam), fender system repairs, pile replacement, pavement repair/replacement, and outfall repairs. These activities include the installation of cathodic protection (anodes) on sheet pile bulkhead; repair of 19,000 square feet of sheet pile wall coating; repair of 233 linear feet of timber fender system; repair of 4 outfalls; and the replacement of 81 timber fender piles with 12-inch steel piles.

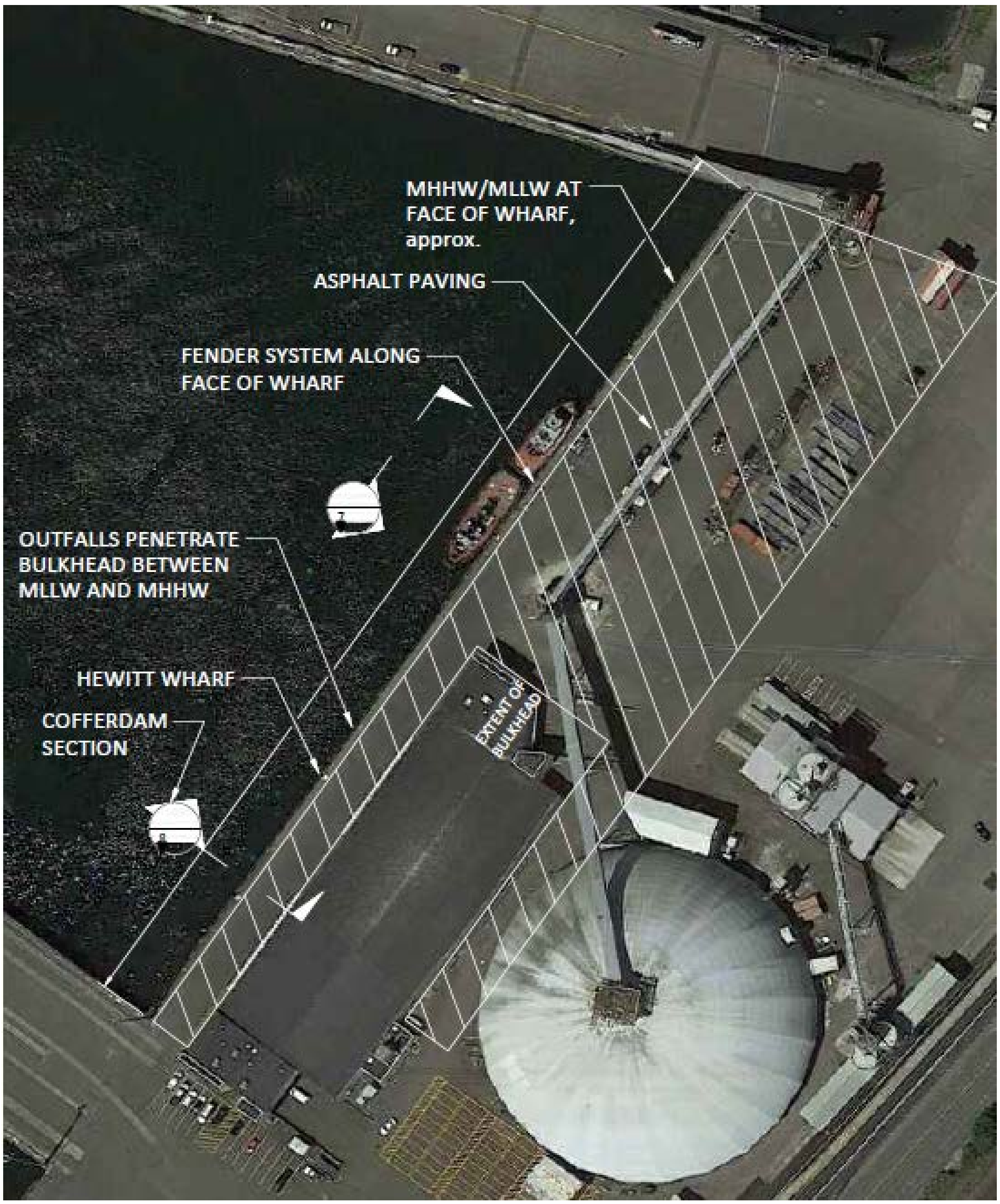


Figure 9. Hewitt Wharf
Pier 1

Pier 1 is located immediately south of Hewitt Wharf, and north of Pacific Terminal (Figure 10). The pier is a 675-foot-long by 140-foot-wide precast, prestressed concrete pile-supported pier with cast-in-place concrete pile caps; precast, prestressed concrete deck panels; and a ballasted deck. The ballasted deck contains the pier utilities and is paved with asphalt. The pier has a continuous fender system with regularly spaced timber and steel fender piles attached to the structure near the deck level. The landward/east end of Pier 1 abuts a sheet pile bulkhead at the head of the pier.

Anticipated activities for Pier 1 are fender system repairs, pile repair/replacement, bulkhead repair, pavement repair/replacement, and outfall repairs. These activities include the repair of steel coating on 4,000 square feet of steel sheet pile bulkhead; repair of 465 linear feet of timber fender system; repair of one outfall; repair of 17 concrete piles with spalls, replacement of four steel piles with 12-inch steel piles, replacement of 12 timber fender piles with 12-inch steel piles; and conduct miscellaneous utility repairs

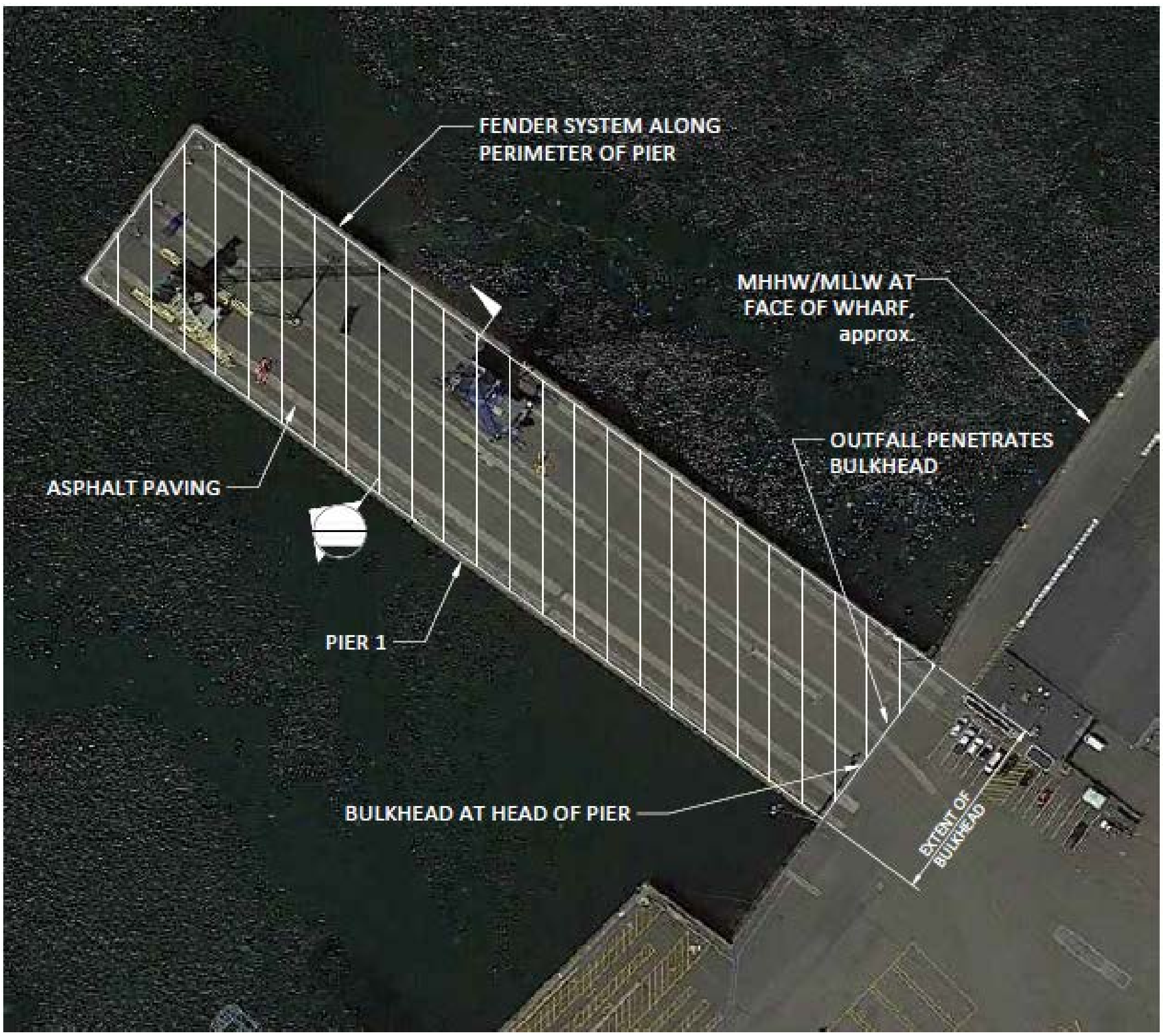


Figure 10. Pier 1
Pacific Terminal

Pacific Terminal is a 653-foot-long by 96-foot-wide precast, prestressed concrete pile-supported wharf with cast-in-place concrete pile caps; precast, prestressed concrete deck panels; and a ballasted deck (Figure 11). The wharf berthing face contains a continuous fender system with regularly spaced timber and steel fender piles attached to the structure near the deck level. At the landward abutment of the wharf, a continuous sheet pile bulkhead below the wharf retains the upland soils. The ballasted deck of Pacific Terminal contains the wharf utilities and is paved with asphalt. The shoreline adjacent to the south of the terminal is armored with riprap.

Anticipated repairs to Pacific Terminal are fender system repairs, pile repair/replacement, utility repair, and pavement repair/replacement. These activities include the repair of 205 linear feet of timber fender system; repair of one outfall; repair of 17 concrete piles with spalls, replacement of four steel piles with 12-inch steel piles, and replacement of 12 timber fender piles with 12-inch steel piles; repair of up to 770 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; and conduct miscellaneous utility repairs.

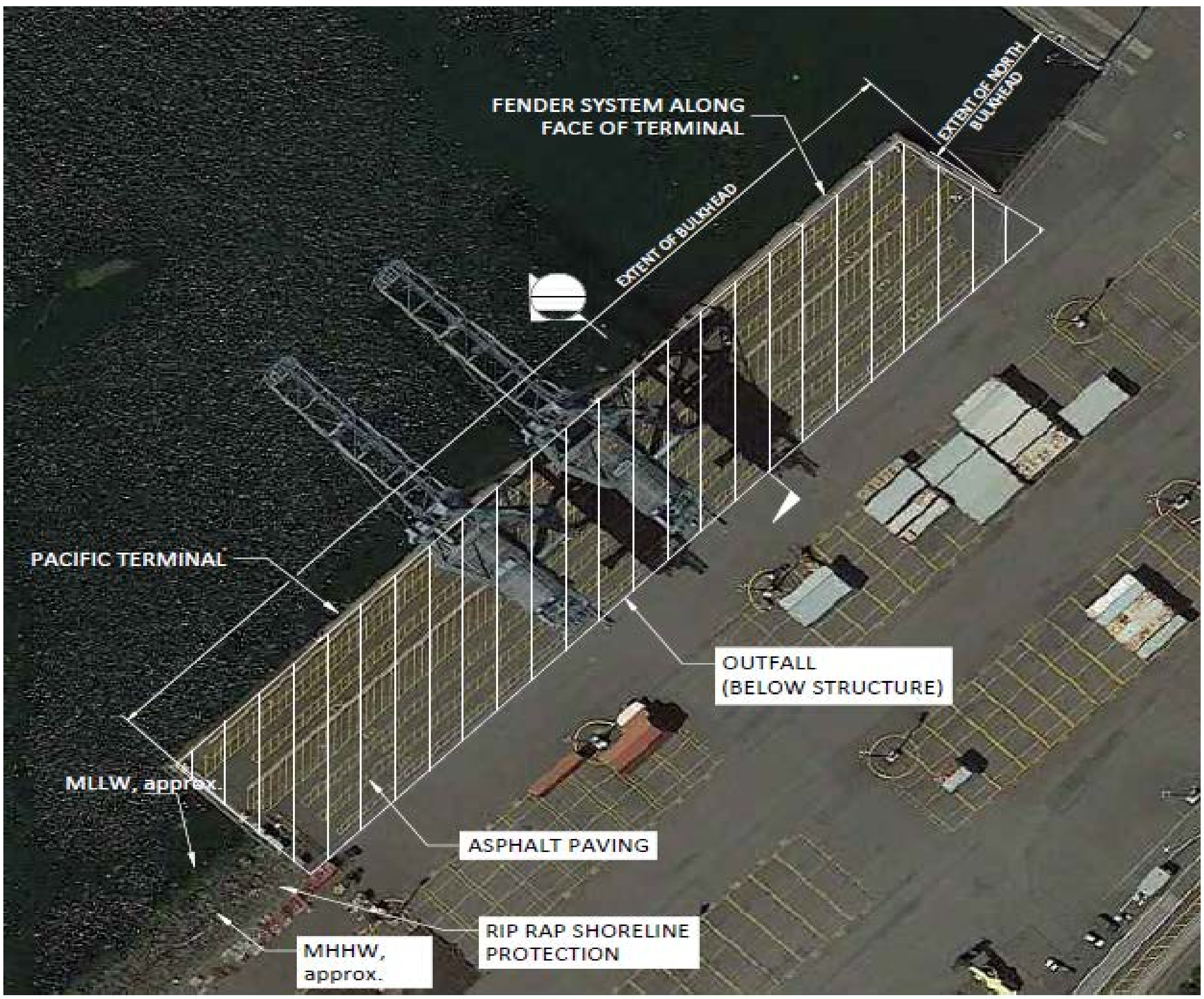


Figure 11. Pacific Terminal

South Terminal

The South Terminal facility includes of a 700-foot wharf, a finger pier to the northeast that extends the berth face, and two additional dolphins also to the northeast (Figure 12). The wharf is supported by steel and precast, prestressed concrete piles; cast-in-place concrete pile caps; precast, prestressed concrete deck panels; and a ballasted deck. The terminal is fendered with 100 timber fender piles and is supported by 50 concrete and 202 steel structural piles. Utilities at the South Terminal may require repair or replacement because of corrosion damage from exposure to the marine environment.

Anticipated activities for the South Terminal are fender system repairs, pile repair/ replacement, utility repair, and pavement repair/replacement. These activities include the repair of 205 linear feet of timber fender system; repair of one outfall; repair three concrete piles with spalls, replace 23 timber fender piles with 12-inch steel piles, repair up to 1,100 linear feet of riprap armoring by adding up to 0.5 cubic yards of riprap per linear foot; and conduct miscellaneous utility repairs.

Figure 12. South Terminal

Table 2. Summary of Proposed Maintenance Activities

Location	Existing Conditions	Structure Repairs	Action/New Material[1]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Excavated Volume Below MHHW (CY)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
Jetty Landing Boat Launch & Guest Dock 8 Boat launch with 13 lanes	• 81 timber floats • 59 concrete floats	Float Repair/ Replacement	• Repair cracks (concrete floats) • Repair spalls (concrete floats) • Replace/repair float wales and rub strips • Timber float repairs (decking replacement, timber framing repairs) • Replace 1 concrete float • Replace 17 timber floats • Add supplemental floatation	NA	NA	NA	NA	No Mitigation (NM): the action will not result in increased overwater coverage or benthic substrate fill. The new material will not result in adverse environmental impacts	Yes	Yes	No
	• Gangway(s)	Pier Repair/ Replacement	• Replace gangway(s)	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No
	• 61 concrete guide piles (16-1/2" diameter) • 1 steel guide pile (16" diameter) • 5 timber fender piles (12" diameter nominal) • 1 steel fender pile (12" diameter)	Pile Repair/ Replacement	• Repair 4 piles with concrete spalls • Replace 7 concrete guide piles (16-1/2" diameter) • Replace 1 steel guide pile (16" diameter) • Replace 5 timber fender piles with steel fender piles (12" diameter) • Replace 1 steel fender pile (12" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes
	• 1,500 linear feet (LF) of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 cubic yards (CY) of riprap stone per LF of shoreline	NA	NA	NA	750	Self Mitigating (SM): riprap will be placed within existing riprap footprint and top-dressed to provide a fish friendly surface if a fish bench is present	No	No	No
	• 40,000 square feet (SF) of concrete pavement	Boat Launch Ramp Repairs	• Repair 40,000 SF of concrete pavement	NA	NA	1,481	1,481	NM	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
Jetty Landing Park (Fishing Pier) Snohomish River recreational fishing pier	• 11 concrete floats	Float Repair/ Replacement	• Repair cracks • Repair spalls • Replace/repair float wales and rub strips • Repair steel/timber guardrail • Replace 1 concrete float • Add supplemental flotation	NA	NA	NA	NA	NM	Yes	Yes	No
	• Gangway(s) • 1,500 SF of timber decking	Pier Repair/Replacement	• Replace gangway(s) • Replace 150 SF of timber decking	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No
	• 9 concrete structural piles (16-1/2"diameter) • 6 concrete guide piles (16-1/2"diameter)	Pile Repair/Replacement	• Repair 2 concrete piles with concrete spalls • Replace 2 concrete guide piles in kind or with steel piles (16 1/2" diameter)	NA	NA	NA	NA	NM	Yes	Yes	Yes – for pile replacement only
	• 200 LF of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 CY of riprap stone per LF of shoreline	NA	NA	NA	100	SM: riprap will be placed within existing riprap footprint and top-dressed to provide a fish friendly surface over the fish bench	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
Jetty Island Docks Docks that provide access to Jetty Island (Port-owned and man-made using Snohomish River sediment)	• 51 concrete floats	Floats	• Repair cracks • Repair spalls • Replace/repair float wales and rub strips • Replace 1 concrete float • Install supplemental flotation	NA	NA	NA	NA	NM	No	No	No
	• Gangway(s)	Pier Repair/ Replacement	• Replace gangway(s)	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No
	• Debris log boom	Repair/Replace Debris Log Boom	• Repair debris log boom • Replace debris log boom and hardware	NA	NA	NA	NA	NM	Yes	Yes	No
	• 4 concrete structural piles (20" diameter) • 1 steel guide pile (16" diameter) • 28 timber guide piles (12" diameter nominal) • 21 timber dolphin piles (12" diameter nominal)	Pile Repair/ Replacement	• Repair 2 concrete piles with concrete spalls • Replace 1 steel pile with steel or concrete pile (16" diameter) • Replace 7 timber guide piles with steel or concrete piles (12" diameter) • Replace 9 timber dolphin piles with steel piles (12" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes – for pile replacement only
North Marina (including Travelift Pier and Docks) ~150 boat slips for yachts (includes facilities for power, pump-out, restrooms, and laundry)	• 977 concrete floats	Floats	• Repair cracks • Repair spalls • Replace/repair float wales and rub strips • Install supplemental flotation • Replace 10 concrete floats	NA	NA		NA	NM	Yes	Yes	Yes
	• 8 outfalls	Outfall Repair	• Repair 2 outfalls	NA	NA	6	6	NM	Yes	Yes	No
	• Gangway(s) • Walkway/railing • Hardware	Pier Repair/ Replacement	• Replace gangway(s) • Repair walkway/railing • Replace hardware	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No
	• 82 concrete guide piles (16-1/2" diameter) • 216 steel guide pile (16" diameter)	Pile Repair/ Replacement	• Repair 2 concrete guide piles with concrete spalls • Replace 5 concrete guide piles with steel or concrete piles (16-1/2" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes – for pile replacement only

Location	Existing Conditions	Structure Repairs	Action/New Material[1]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Excavated Volume Below MHHW (CY)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
North Marina (including Travelift Pier and Docks) continued	• 23 timber guide piles (12" diameter nominal)		• Replace 22 steel guide piles with steel or concrete piles (16" diameter) • Replace 7 timber guide piles with steel or concrete piles (12" diameter)								
	• 3,000 LF of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 CY of riprap stone per LF of shoreline	NA	NA	NA	1,500	SM: riprap will be placed within existing riprap footprint and top-dressed to provide a fish friendly surface if a fish bench is present	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
Central Marina (including Yacht Club and Seiner Pier) ~700 boat slips including commercial fishing moorage (includes facilities for power, pump-out, restrooms, and laundry)	• 128,500 SF of boathouses/floats	Boathouse/float Removal/ Relocation	• Remove/relocate 128,500 SF of boathouses/floats	TBD	NA	NA	NA	SM: boathouse footprint will not be expanded after relocation. The same number and size of piles will be removed from the boathouses original location resulting in no net increase to benthic impacts	Yes	Yes	Yes
	• 125 LF of timber breakwater • 60 LF of timber breakwater	Breakwater Repair/ Replacement	• Repair of 125 LF of timber breakwater • Repair of 60 LF of timber breakwater • Replace 125 LF of timber breakwater with concrete or steel breakwater	NA	NA	NA	NA	The related float and finger pile reconfiguration has not been specifically determined yet but is expected to result in reduced overwater coverage therefore no mitigation is proposed	Yes	Yes	No
	• 34,000 SF of steel sheet pile wall	Bulkhead Repair	• Repair 22,000 SF of coating	NA	NA	180	180	NM	Yes	Yes	No
	• 1,588 concrete floats • 108 timber floats	Float Repair/Replacement	• Repair cracks (concrete floats) • Repair spalls (concrete floats) • Replace/repair float wales and rub strips • Timber float repairs (decking replacement, timber framing repairs) • Add supplemental floatation • Remove or reconfigure 159 concrete floats • Replace 45 concrete floats • Replace 11 timber floats with concrete floats	-25,440	NA	NA	NA	NM: action will result in less overwater coverage	Yes	Yes	No
	Fuel Dock composed of concrete floats and fueling pumps with timber guide piles	Fuel Dock Reconfiguration/ Relocation	Fuel dock would be reconfigured within the Central Marina to improve navigation within the marina	'-5,060	NA	NA	NA	SM: no net increase in overwater coverage. Pile driving in a new location would be considered a benthic impact, which will be mitigated by removal of the existing piles associated with the dock.	Yes	Yes	No
	• 5 outfalls	Outfall Repair	• Repair 5 outfalls	NA	NA	15	15	NM	Yes	Yes	No

Location	Existing Conditions	Structure Repairs	Action/New Material[1]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Excavated Volume Below MHHW (CY)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
Central Marina (including Yacht Club and Seiner Pier) (continued)	• Gangway(s) • Walkway/railing • Hardware	Pier Repair/ Replacement	• Replace gangway(s) • Repair walkway/railing • Replace hardware	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No
	• 176 steel guide piles (16" diameter) • 748 timber guide piles (12" diameter nominal) • 27 timber fender piles (w/in 3 dolphins) (12" diameter nominal)	Pile Repair/ Replacement	• Replace 17 steel guide piles with steel or concrete piles (16" diameter) • Relocate 14 steel guide piles (boathouse guide piles) (16" diameter) • Replace 200 timber guide piles with steel or concrete piles (12" diameter) • Replace and relocate 61 timber guide piles (boathouse guide piles) (12" diameter) • Replace 27 timber fender piles with steel piles or groups of timber piles with larger diameter steel piles (overall reduction in pile area) (12 to 36"diameter)	NA	NA	NA	NA	NM: the mean area of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
South Marina (including ADA Dock) ~1,000 boat slips and covered moorage (includes facilities for power, pump-out, restrooms, and laundry)	Covered moorage demolition will occur to accommodate the relocated boathouses from the Central Marina; repair/replacement of covered moorage roofing may occur until demolition is completed; Covered moorage is composed of: • 236,700 SF of covered moorage	Covered Moorage Repair/Replace/ Demolish	Existing covered moorage in the South Marina will be removed to make room for the relocated boathouses. The boathouses will require 75 steel replacement guide piles, which will be installed using a vibratory methods. • Demolish 236,700 SF of covered moorage • Repair/replace 150,000 SF of roofing	NA	NA	NA	NA	NM: no net increase in overwater coverage	Yes	Yes	Yes
	• 3,505 concrete floats	Floats	• Repair cracks • Repair spalls • Replace/repair float wales and rub strips • Install supplemental flotation • Replace 64 concrete floats • Remove 527 floats	-84,320	NA	NA	NA	NM: action will result in less overwater coverage	Yes	Yes	No
	• 12 outfalls	Outfall Repair	• Repair 12 outfalls	NA	NA	36	36	NM	Yes	Yes	No
	• Gangway(s) • Walkway/railing • Hardware • 7,700 SF of timber decking (ADA Dock & Seiner Wharf)	Pier Repair/ Replacement	• Replace gangway(s) • Repair walkway/railing • Replace hardware • Replace 770 SF of timber decking	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No

Location	Existing Conditions	Structure Repairs	Action/New Material[1]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Excavated Volume Below MHHW (CY)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
South Marina (including ADA Dock) (continued)	• 5,000 LF of timber elements (ADA Dock)		• Replace 500 LF of Damaged timber elements								
	• 51 steel guide piles (16" diameter) • 575 timber guide piles (12" diameter nominal)	Pile Repair/ Replacement	• Replace 6 steel piles with concrete or steel piles (16" diameter) • Replace 173 timber piles with concrete or steel piles (12" diameter) • Install 75 steel guide piles (relocated boathouse guide piles) (12 to 16" diameter)	NA	NA	NA	NA	NM: the mean area of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes
	• 3,000 LF of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 CY of riprap stone per LF of shoreline	NA	NA	NA	1,500	SM: riprap will be placed within existing riprap footprint and top-dressed to provide a fish friendly surface if a fish bench is present	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
Dunlap Facility/former Vigor Facility Terminal providing boat access and location of the Dunlap Towing Company	• 200 LF fender system (not including fender piles)	Fender System Repair	• Replace hardware • Replace 40 LF of timber elements	NA	NA	NA	NA	NM	No	No	No
	• Gangway(s)	Pier Repair/ Replacement	• Replace gangway(s)	NA	NA	NA	NA	NM: no net increase in overwater coverage	No	No	No
	• 24 timber fender piles (12" diameter nominal) • 18 steel dolphin piles (12" diameter)	Pile Repair/ Replacement	• Replace 2 timber fender piles with steel fender piles • Repair 6 steel piles (12" diameter) • Replace 9 steel piles (12" diameter)	NA	NA	NA	NA	NM: the mean area of the replacement piles will not increase	Yes	Yes	Yes
	• 1 outfall	Outfall Repair	• Repair outfall	NA	NA	3	3	NM	Yes	Yes	No
Pier 3 (MTCA Site) Finger pier that provides ship berths	• 4,200 SF of steel sheet pile wall	Bulkhead Repair	• Repair coating overwater with epoxy coating system on steel sheet pile wall • Repair 4,200 SF of steel sheet pile • Install 12 new steel piles (24"diameter in front of existing bulkhead)	NA	NA	25	25	NM: the mean diameter of replacement piles will not increase impacts to benthic habitat. Mitigation required (MR): new steel piles will add to the benthic impact by 3.16 SF per piles x 12 piles = +38 SF	Yes	Yes	Yes – for pile replacement only
	• 1,700 LF fender system (not including fender piles)	Fender System Repair	• Repair 476 LF of fender system	NA	NA	NA	NA	NM	No	No	No
	• 1 outfall	Outfall Repair	• Repair 1 outfall	NA	NA	3	3	NM	Yes	Yes	No
	• 560 concrete structural piles (Pile area = 3.3 SF/pile) (24" diameter) • 193 structural steel piles (20" diameter)	Pile Repair/ Replacement	• Repair 50 structural concrete piles w/ pile jackets (Jacket area = 7.1 SF/jacket) • Repair 84 structural steel piles	NA	+190	25	25	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat.	Yes	Yes	Yes – for pile replacement only

Location	Existing Conditions	Structure Repairs	Action/New Material[1]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Excavated Volume Below MHHW (CY)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
Pier 3 (continued)	• 63 steel fender piles (12" diameter) • 91 timber fender piles (12" diameter nominal)		• Replace 20 steel fender piles in kind (12" diameter) • Replace 91 timber fender piles with steel fender piles (12" diameter)					(MR): pile jackets for concrete piles will increase the mean diameter of the subject piles by 3.8 SF each. This increase to benthic impacts will be mitigated by use of the mitigation sites identified by the Port (see section 8 in the JARPA)			
	• 200 LF of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 CY of riprap stone per LF of shoreline	NA	NA	NA	100	SM: riprap will be placed within existing riprap footprint	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
Hewitt Wharf Berth with a paved asphalt deck	• 34,000 SF of steel sheet pile wall	Bulkhead Repair	• Install cathodic protection anodes • Repair 19,000 SF of coating	NA	NA	93	93	NM	Yes	Yes	No
	• 830 LF fender system (not including fender piles)	Fender System Repair	• Repair 233 LF of timber elements in kind	NA	NA	NA	NA	NM	No	No	No
	• 4 outfalls	Outfall Repair	• Repair 4 outfalls	NA	NA	12	12	NM	Yes	Yes	No
	• 81 timber fender piles (12" diameter)	Pile Repair/ Replacement	• Replace 81 timber fender piles with steel piles (12" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes
Pier 1 (MTCA Site) Finger pier that provides ship and barge berths	• 4,000 SF of steel sheet pile wall	Bulkhead Repair	• Repair 4,000 SF of coating	NA	NA	17	17	NM	Yes	Yes	No
	• 1,600 LF fender system (not including fender piles)	Fender System Repair	• Repair 465 LF fender system	NA	NA	NA	NA	NM	No	No	No
	• 1 outfall	Outfall Repair	• Repair 1 outfall	NA	NA	3	3	NM	Yes	Yes	No
	• 730 concrete structural piles (24" diameter) • 63 steel fender piles (12" diameter) • 91 timber fender piles (12" diameter nominal)	Pile Repair/ Replacement	• Repair 17 concrete piles with spalls • Replace 4 steel timber piles in kind (12" diameter) • Replace 12 timber fender piles with steel fender piles (12" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes – for pile replacement only
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
Pacific Terminal (MTCA Site) Primary container and breakbulk facility	• 730 LF fender system (not including fender piles)	Fender System Repair	• Repair 205 LF fender system	NA	NA	NA	NA	NM	No	No	No
	• 1 outfall	Outfall Repair	• Repair 1 outfall	NA	NA	3	3	NM	Yes	Yes	No
	• 340 concrete structural piles (18" diameter) • 40 steel fender piles (12" diameter)	Pile Repair/ Replacement	• Repair 17 concrete piles with spalls • Replace 4 steel timber piles in kind (12" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes – for pile replacement only

Location	Existing Conditions	Structure Repairs	Action/New Material[1]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Excavated Volume Below MHHW (CY)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
Pacific Terminal (continued)	• 39 timber fender piles (12" diameter nominal)		• Replace 12 timber fender piles with steel fender piles (12" diameter)								
	• 770 LF of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 CY of riprap stone per LF of shoreline	NA	NA	NA	385	SM: riprap will be placed within existing riprap footprint	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No
South Terminal (MTCA site) Contains a storage area, concrete dolphin berth, and warehouse served by a rail line	• 850 LF fender system (not including fender piles)	Fender System Repair	• Repair 205 LF fender system	NA	NA	NA	NA	NM	No	No	No
	• 1 Outfall	Outfall Repair	• Repair 1 outfall	NA	NA	3	3	NM	Yes	Yes	No
	• 272 concrete structural piles (18 to 24" diameter) • 368 steel structural piles (16" diameter) • 100 timber fender piles (12" diameter nominal)	Pile Repair	• Repair 3 concrete piles spalls • Replace 23 timber fender piles with steel fender piles (12" diameter)	NA	NA	NA	NA	NM: the mean diameter of the replacement piles will not increase impacts to benthic habitat	Yes	Yes	Yes – for pile replacement only
	• 1,100 LF of riprap shoreline	Riprap Supplement	• Supplement riprap with 0.5 CY of riprap stone per LF of shoreline	NA	NA	NA	550	SM: riprap will be placed within existing riprap footprint	No	No	No
	• Utilities	Utility Repairs	• Miscellaneous utility repairs	NA	NA	NA	NA	NM	No	No	No

1.3.4 Mitigation

The currently proposed mitigation plan includes the following three categories of activity: (1) overwater structure removal, (2) supplemental pile removal, and (3) intertidal debris cleanup. The following mitigation actions (Table 3) have been identified to offset the increase to benthic impacts from the proposed pile jacket repairs or pile placement. The Annual Planning and Compliance Form (Appendix A), will document what maintenance occurred in a calendar year and what, if any, corrective actions were needed. Where possible, mitigation will be completed at the same time as the activities with impacts requiring mitigation. Mitigation and all repair activities are summarized in Tables 2 and 3.

Port has identified five mitigation opportunities at various facilities. These mitigation activities would reduce overwater coverage, increase benthic habitat (e.g. through debris/pile removal, etc.) and improve nearshore habitat conditions. A total of seventeen 12-inch-diameter, creosote-treated timber piles may be removed at the Jetty Island Docks. Fifteen 12-inch-diameter, creosote-treated timber piles may be removed at the north notch of Pier 3, and a steel gangway access pier may be demolished at Pier 3. The Seiner Pier at the Central Marina and an open-deck finger pier at the Dunlap Facility may be demolished. Float removal may be used as a credit for possible float enlargement elsewhere in the marina. If needed, there are more than one hundred 12-inch-diameter creosote-treated timber piles that may be removed from the waterfront area near the Riverside Business Park on the Snohomish River. The types of action and the mitigation required are described above in Table 2 Summary of Proposed Maintenance Activities. Additionally, the Port may opt to use credits from the Union Slough Advance Credit Restoration area as mitigation for maintenance/repair activities that may require mitigation during the duration of the permit.

Table 3. Mitigation Opportunities

Location	Existing Conditions	Structure Repairs	Action/New Material[7]	Area of New Overwater Coverage (SF)	Area of New Benthic Impact (SF)	Fill Volume Below MHHW (CY)	Aquatic Impacts/Mitigation	Fish Window	Water Quality Monitoring	Marine Mammal Monitoring
Jetty Island Docks – Mitigation Opportunity	Timber piles • 17 timber piles (12" diameter nominal)	Demolition piles	• Remove 17 timber piles (12" diameter nominal)	NA	-13.35	NA	M: Removal of 17 timber piles	Yes	Yes	Yes
Central Marina-Mitigation Opportunity	Seiner Pier • 9450 SF timber pier • 215 timber structural, guide and fender piles (12" diameter nominal)	Demolition Seiner Pier	• Remove 9,450 SF of timber pier (railing, decking, stringers, pile caps) • Remove 215 timber piles (structural, guide and fender piles) (12" diameter nominal)	NA	-172	NA	M: Removal of 9,450 SF of timber pier, including railing, decking, stringers and pile caps. Removal of 215 timber piles, including structural, guide and fender piles:	Yes – pile removal	Yes – during pile removal	Yes - during pile removal
Dunlap/former Vigor Facility – Mitigation Opportunity	Open deck finger pier • 1,500 SF of Steel and timber open deck finger pier • 40 timber piles (12" diameter nominal)	Demolition open deck finder pier	• Remove 1,500 SF of open deck finger pier • Remove 40 timber piles (12" diameter nominal)	NA	-32	NA	M: Removal of 1,500 SF of open deck finger pier, removal of 40 timber piles	Yes	Yes - during pile removal	Yes – during pile removal
Pier 3 – Mitigation Opportunity	Timber piles • 15 timber piles (12" diameter nominal)	Demolition piles	• Remove 15 timber piles (12" diameter nominal)	NA	-12	NA	M: Removal of 15 timber piles	Yes	Yes	Yes
	Gangway access pier • 160 SF steel pier	Demolition gangway pier	• Remove 160 SF of steel pier	-160	NA	NA	M: Removal of 160 SF of steel pier	No	No	No
Riverside Business Park – Mitigation Opportunity Timber piles in the Snohomish River along the Riverside Business Park	Timber piles • +100 timber piles (12" diameter nominal)	Demolition piles	• Remove +100 timber piles (12" diameter nominal)	NA	NA	NA	M: Removal of +100 timber piles (12" diameter nominal)	Yes	Yes	Yes

Minimization Measures

- In-water work will be conducted only during the approved in-water work window (16 July to 15 February) for marine waters of Puget Sound (including Port Gardner Bay).
- Project construction will be completed in compliance with Washington State Water Quality Standards (Washington Administrative Code [WAC] 173-201A), including
    i. Petroleum products, fresh cement, lime, concrete, chemicals, or other toxic or deleterious materials will not be allowed to enter surface waters.
    ii. There will be no discharge of oil, fuels, or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
    iii. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc., will be checked regularly for leaks, and materials will be maintained and stored properly to prevent spills.
- A spill prevention, control, and countermeasures (SPCC) plan will be prepared by the Contractor and used during all demolition and construction operations. A copy of the plan with any updates will be maintained at the work site.
    i. The SPCC plan will outline BMPs, responsive actions in the event of a spill or release, and notification and reporting procedures. The plan will also outline management elements such as personnel responsibilities, project site security, site inspections, and training.
    ii. The SPCC plan will outline the measures to prevent the release or spread of hazardous materials found on site or encountered during construction but not identified in contract documents, including any hazardous materials that are stored, used, or generated on site during construction activities. These items include, but are not limited to, gasoline, diesel fuel, oils, and chemicals.
    iii. Applicable spill response equipment and material designated in the SPCC plan will be maintained at the job site.

General Best Management Practices

Typical construction BMPs for working in, over, and near water will be applied, including activities such as:

- Checking equipment for leaks and other problems that could result in the discharge of petroleum-based products or other material into waters of Port Gardner Bay.
- Corrective actions will be taken in the event of any discharge of oil, fuel, or chemicals into the water, including:
    i. Containment and cleanup efforts will begin immediately upon discovery of the spill and be completed in an expeditious manner in accordance with all local, state, and federal regulations. Spill response will take precedence over normal work. Cleanup will include proper disposal of any spilled material and used cleanup material.
    ii. The cause of the spill will be ascertained and appropriate actions taken to prevent further incidents or environmental damage.
    iii. Spills will be reported to the Washington State Department of Ecology's (Ecology) Northwest Regional Spill Response Office at 425/649-7000.
- Work barges will not be allowed to ground out.
- Excess or waste materials will not be disposed of or abandoned waterward of the OHWM or allowed to enter waters of the state. Waste materials will be disposed of in an appropriate manner consistent with applicable local, state, and federal regulations.
- Demolition and construction materials will not be stored where wave action or upland runoff can cause materials to enter surface waters.
- Oil-absorbent materials will be present on site for use in the event of a spill or if any oil product is observed in the water.

Pile Removal BMPs

Pile removal BMPs will be applied, including the following.

- A containment boom will surround the work area to contain and collect any floating debris and sheen. Any debris will be retrieved and disposed of properly.
- The piles will be dislodged with a vibratory hammer, or pulled with heavy equipment like an excavator, when possible and will not be intentionally broken by twisting or bending.
- The piles will be removed in a single, slow, and continuous motion in order to minimize sediment disturbance and turbidity in the water column.
- If a pile breaks above or below the mudline, it will be cut or pushed in the sediment consistent with agency approved BMPs. Any cut or broken pilings will be marked with GPS coordinates and provided to the regulatory agencies and the Port to document any piles left in place.
- Removed piles, stubs, and associated sediments (if any) will be contained on a barge or upland. If piles are placed directly on the barge and not in a container, the storage area will consist of a row of hay or straw bales, filter fabric, or similar material placed around the perimeter of the barge.
- All creosote-treated material, pile stubs, and associated sediments (if any) will be disposed of by the Contractor in a landfill approved to accept those types of materials.

Pile Installation BMPs

Pile installation BMPS to be applied will include the following.

- A vibratory hammer will be used to drive in-water steel piles to minimize noise levels. An impact hammer may be used when piles are driven in the dry.
- Pile installation will be conducted during the approved in-water work window for this area (16 July to 15 February) unless piles can be installed in the dry. All in-water work will be completed within the work window when ESA-listed species are least likely to be present.

Overwater Concrete Placement Repair Minimization and BMPs
On-site concrete placement will follow appropriate BMPs, including:

- Wet concrete will not come into contact with surface waters.
- Forms for any concrete repairs will be constructed to prevent leaching of wet concrete. Underwater concrete repairs will be placed by tremie into sealed forms to minimize contact with the water.
- Concrete process water will not be allowed to enter the bay. Any process water/contact water will be routed to a contained area for treatment and will be disposed of at an upland location.
- Water quality monitoring will be performed during repairs to verify consistency with state water quality standards.

Model Toxic Control Act BMPs
Actions taken within MTCA sites will follow appropriate BMPs for contaminated soils. These BMPs are based on the 2014 Memorandum regarding Phase 2 Central Marina Improvements, the 2016/2017 Memorandum regarding the Marine Terminals Fender Pile Replacement Project, and the 2017 Memorandum regarding the Port of Everett South Terminal Wharf Strengthening project. These BMPs include the following.

Pile Extraction
The following BMPs will be implemented for all pile extraction completed within the boundaries of the Port MTCA cleanup action areas.

- Every attempt shall be made to completely remove each pile in its entirety.
- Vibratory extraction is the preferred method of pile removal. The crane operator will be trained to remove pile slowly, which will minimize turbidity in the water column as well as sediment disturbance. The operator will “wake up” pile to break bond with sediment.
- Other direct pulling means are optional if the contractor determines it to be appropriate for the substrate type and structural integrity of the piling.
- Broken and damaged piling that cannot be removed by either vibratory extraction or direct pull shall be removed with either a clamshell bucket or environmental clamshell. The size of the clamshell bucket will be minimized to reduce turbidity during piling removal. The clamshell bucket will be emptied of material onto a contained area on the barge before it is lowered into the water.
- Piles located in contaminated sediments shall be removed slowly, and in a direction that is an extension of the longitudinal centerline of the pile, to minimize the disturbance of the bed and the suspension of sediments into the water column.
- Extraction holes will be backfilled with uncontaminated backfill material imported from off site.

- Extracted piles shall be immediately placed in a containment basin constructed on a barge or on adjacent upland to capture and contain the extracted piles, adhering sediments and water. The extracted piles shall not be shaken, hosed-off, left hanging to drip, or any other action intended to clean or remove adhering material from the pile.
- Cutting is required if the pile breaks off at or near the existing substrate and cannot be removed. Prior to commencement of the work, the Port or Port's contractor will assess the condition of the piling. The Port will create a log outlining the location and number of piling that are known to need to be cut or broken off and provide this log to the agencies. Every attempt will be made to completely remove each pile in its entirety before cutting. If a pile is broken or breaks during extraction, one of the methods listed below shall be used to cut the pile.

Pile Cutting

The following BMPs will be implemented for pile cutting, as needed, completed within the boundaries of the Port MTCA cleanup action areas.

- A pile shall be cut off using a pneumatic underwater chainsaw if it cannot be removed or if the pile breaks off at or near the sediment interface.
- The pile should be cut at least 1 foot below the mudline using a pneumatic underwater chainsaw if the entire pile cannot be removed.
- In deep subtidal areas, if the piling is broken off greater than 1 foot below the mudline, the piling may remain. In intertidal and shallow subtidal areas, seasonal raising and lowering of the beach could expose the piling above the mudline and leach out contaminants. In this case, the piling should be cut off at least 2 feet below the mudline if it is accidentally broken off during removal.
- A small bucket should be used to carefully remove sediment if contaminated sediment must be removed to expose piling below the mudline for cutting.
- Turbidity monitoring shall be completed throughout the piling exposure and cutting process if contaminated sediment must be removed to expose the piling to be cut. Turbidity monitoring requirements are summarized below. The piling exposure and cutting process will be immediately halted and Ecology will be consulted for approval of alternative methodology if turbidity monitoring criteria are exceeded.
- Contaminated sediment removed by bucket will be removed to secure containment and disposed of offsite.
- Piles shall be exposed and cut off at lowest practical tide condition and at slack water. This is intended to reduce turbidity due to reduced flow and the short water column through which pile must be withdrawn.
- Contractors (or the Port) shall create a log of the GPS location of each piling that is cut off.
- The cutoff pile stub and any broken pile shall be captured, removed, and deposited in the containment basin constructed on the barge or adjacent upland.
- The associated sawdust shall be captured (whenever feasible), removed, and deposited in the containment basin constructed on the barge or adjacent upland.

In-Water Pile Debris Capture

The following BMPs will be implemented to contain in-water pile debris.

- A floating surface boom shall be installed around the pile extraction site to capture floating pile debris. Floating pile debris shall be removed and deposited in the containment basin constructed on the barge or adjacent upland.
- The contractor (or Port) shall have absorbent pads available and ready to use to contain any oil sheens that may appear. The absorbent pads shall be removed and deposited in the containment basin constructed on the barge or adjacent upland.
- If oil sheen or other evidence of chemical contamination is observed at any time at this site during the course of work to be performed, operations will be immediately halted and the sheen or other chemical contamination reported. Ecology and other appropriate agencies will be consulted for direction prior to the resumption of work.

Resuspension/Turbidity
Pile extraction and other repairs that may disturb sediment within the MTCA sites shall be conducted during periods when the water currents are low to the extent possible.

Water Quality Monitoring
The purpose of water quality monitoring is to evaluate whether the BMPs described in this document are effectively addressing sediment contamination redistribution at the Port's MTCA sites.

- The maintenance or repair activity shall be immediately halted if water quality monitoring detects exceedances of monitoring criteria and alternative management practices will be identified and evaluated. Ecology shall be contacted for approval of proposed alternative management practices prior to work commencing again.
- A Port representative will be on site to monitor water quality when maintenance activities that may disturb sediment are being conducted within the boundaries of the MTCA sites. Monitoring will be completed for the measurement of turbidity using a direct-measurement field meter or automated system.
- Turbidity monitoring shall be conducted hourly, at a minimum, at all times while piling is installed and at any time sediment may be affected by project activities.
- All piling installation work and other maintenance activities that may disturb sediment at the MTCA sites will be halted, including turbidity monitoring, during periods of restricted visibility or other periods that could cause unsafe conditions. The maintenance activity, including turbidity monitoring, shall be postponed until conditions are safe. The time of work cessation will be recorded in the daily monitoring report. Regular work on the project will resume once the visibility resumes to safe level.

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 COE determined that the proposed action is not likely to adversely affect GB yelloweye or bocaccio rockfish. We have determined the proposed action is also not likely to adversely affect SR killer whales. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (2.12).

2.1 Analytical Approach

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

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

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

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

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and

cumulative effects to assess the risk that the proposed action poses to species and critical habitat.

- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

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

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

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Abatzoglou et al. 2014; Kunkel et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote et al. 2014). Decreases in summer precipitation of as much as 30% by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2013; Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al. 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al. 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al. 2014).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009).

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

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

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7oC 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 (Tillmann and Siemann 2011, Reeder et al. 2013). Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. Acidification also impacts sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely et al. 2012, Sunda and Cai 2012).

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

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

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these ESUs (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic impacts on species and ecosystems (Doney et al. 2012). These conditions will possibly intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.1 Status of the Species

Table 4, below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

Table 4. Listing classification and date, recovery plan reference, most recent status review, status summary, and limiting factors for each species considered in this opinion.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Chinook salmon	Threatened 6/28/05	Shared Strategy for Puget Sound 2007 NMFS 2006	NWFSC 2015	This ESU comprises 22 populations distributed over five geographic areas. Most populations within the ESU have declined in abundance over the past 7 to 10 years, with widespread negative trends in natural-origin spawner abundance, and hatchery-origin spawners present in high fractions in most populations outside of the Skagit watershed. Escapement levels for all populations remain well below the TRT planning ranges for recovery, and most populations are consistently below the spawner-recruit levels identified by the TRT as consistent with recovery.	• Degraded floodplain and in-river channel structure • Degraded estuarine conditions and loss of estuarine habitat • Degraded riparian areas and loss of in-river large woody debris • Excessive fine-grained sediment in spawning gravel • Degraded water quality and temperature • Degraded nearshore conditions • Impaired passage for migrating fish • Severely altered flow regime
Puget Sound steelhead	Threatened 5/11/07	In development	NWFSC 2015	This DPS comprises 32 populations. The DPS is currently at very low viability, with most of the 32 populations and all three population groups at low viability. Information considered during the most recent status review indicates that the biological risks faced by the Puget Sound Steelhead DPS have not substantively changed since the listing in 2007, or since the 2011 status review. Furthermore, the Puget Sound Steelhead TRT recently concluded that the DPS was at	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest • Threats to diversity posed by use of two hatchery steelhead stocks • Declining diversity in the DPS, including the uncertain but weak status of summer-run fish • A reduction in spatial structure • Reduced habitat quality • Urbanization • Dikes, hardening of banks with riprap, and channelization

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
				very low viability, as were all three of its constituent MPGs, and many of its 32 populations. In the near term, the outlook for environmental conditions affecting Puget Sound steelhead is not optimistic. While harvest and hatchery production of steelhead in Puget Sound are currently at low levels and are not likely to increase substantially in the foreseeable future, some recent environmental trends not favorable to Puget Sound steelhead survival and production are expected to continue.	

There are two Snohomish River basin PS Chinook salmon populations, the Skykomish and the Snoqualmie that use the action area. The Skykomish Chinook salmon spawn throughout the main stem and in some tributaries of the Skykomish and Snohomish rivers. The Snoqualmie population spawns in the Snoqualmie River and its tributaries, including the Tolt and Raging rivers and Tokul Creek. Over the last two five year geometric mean counts of spawners (2005-2009 and 2010-2014), the Skykomish Chinook population has suffered a negative 29 percent decrease, while the Snoqualmie spawner population has exhibited a 32 percent decrease (NWFSC 2015).

Summer-run and winter-run steelhead stocks are present in the Snohomish basin; both runs are composed of wild and hatchery-raised steelhead. The winter run is the larger of the two stocks. Three wild winter steelhead stocks have been identified from the Snohomish/Skykomish, Snoqualmie, and Pilchuck rivers (NMFS 2005). Over the last two five year geometric mean counts of spawners (2005-2009 and 2010-2014), the Snohomish/Skykomish steelhead population has suffered a negative 70 percent decrease (NWFSC 2015).

2.2.2 Status of the Critical Habitat

This section describes the status of designated critical habitat affected by the proposed action by examining the condition and trends of the essential physical and biological features of that habitat throughout the designated areas. These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging).

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

A summary of the status of critical habitat, considered in this opinion, is provided in Table 5, below.

Table 5. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Puget Sound Chinook salmon	9/02/05 70 FR 52630	Critical habitat for Puget Sound Chinook salmon includes 1,683 miles of streams, 41 square mile of lakes, and 2,182 miles of nearshore marine habitat in Puget Sounds. The Puget Sound Chinook salmon 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.

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). Temporary elevated underwater sound pressure levels (SPLs) from vibratory pile driving is expected to have the farthest reaching effects in the aquatic environment. In this case, the action area is defined as extending 21 miles from vibratory pile driving activities or until the sound is constrained by encountering las masses, jetties, and/or bulkheads. This is where temporary elevated underwater sound pressure levels (SPLs) will be above background levels (120 dB_{RMS}).

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).

During the last twenty years, NMFS has engaged in Section 7 consultations on Federal projects impacting these populations and their habitats in the Port action area, and those impacts have been taken into account in this opinion. Approximately 50 ESA consultations pertaining to structures and operations within the Port were completed since 2000. In the last five years these consultations covered dredging, dock maintenance and repair, stormwater upgrades, and restoration including Riprap Replacement (NWR-2013-297), Install Pilings (WCR-2013-33), New Piles (WCR-2014-361), Sediment Dredge (WCR-2013-115), Piling Replacement (WCR-2015-1900), Whaler Beam Repair (WCR-2014-1649), Shoreline Stabilization (WCR-2014-1500), Clamshell Dredging (WCR-2014-890), Bulkhead Maintenance (WCR-2016-4955), Bulkhead Replacement (WCR-2016-5510), Piling Repair (WCR-2016-5484), 10th Street Boat Launch and Maintenance Dredge (WCR-2017-7780), South Terminal Wharf Strengthening (WCR-2017-7327), and Wharf Waler Replacement (WCR-2017-7910). Each of these actions incorporated minimization and mitigation measures, including habitat and storm water improvements, contaminate cleanup, creosote pile removal, and improved "environmental friendly" structures.

Much of shoreline along the Everett waterfront has been modified by hard structures, including rock riprap, pilings, concrete bulkheads, docks and adjacent roads, parking lots, and industrial yards and buildings (City of Everett et al. 2001). This area has been extensively dredged and filled, primarily for timber-related industries, since the inception of the City of Everett. Filling has occurred just south of Preston Point, at the 10th Street boat launch, the north and south marinas, and the naval base. It is estimated that these activities reduced the area of historical intertidal mudflats by approximately 50 percent (Pentec 1992). Extensive mudflats do persist waterward of Maulsby Swamp and along the east side of Jetty Island, but they have been extensively used historically for log raft storage (City of Everett et al. 2001).

The proposed activities are located in the marine nearshore at the mouth of the Snohomish River (Figure 2). The north portion of the Port is situated entirely within Port Gardner and the

Snohomish River mouth. The south portion contains the East Waterway and Possession Sound. Possession Sound consists of the large embayment at the mouth of the Snohomish River, including Ebey and Steamboat Sloughs. Extensive mudflats are present at the river mouth in the eastern portion of the sound. The Washington State Department of Natural Resources (DNR) mapped extensive eelgrass patches in this area as well (DNR 2017); however, eelgrass beds are not present or documented in the proposed work areas. Water quality within the Sound is generally good.

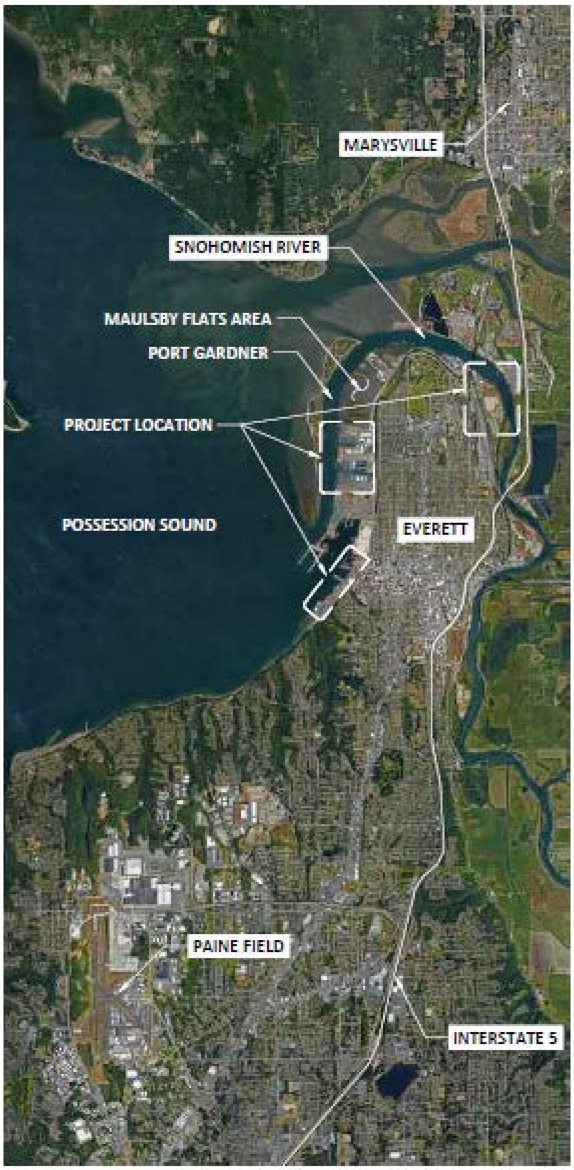


Figure 13. Vicinity Map

Port Gardner is located at the mouth of the Snohomish River between Jetty Island and Everett. The construction of Jetty Island altered the discharge point of the Snohomish River and, subsequently, the sediment transport regime the lower river. The Snohomish River Channel has been dredged regularly by the COE to maintain navigational access and the Port conducts regular dredging to maintain its berths and marinas (Haring 2002). Dredging has altered native habitats and resulted in substrates comprised primarily of sands and silts.

The terminals and marinas within Port Gardner have been developed to include many overwater coverages. State Route 529 runs along the shore and is protected by armoring. Remnant mudflats are present in Port Gardner, but they have been altered by the construction of Jetty Island and the regular maintenance of the navigation channel. These areas are also used for log rafting and storage by local timber industries. The combination of overwater coverage and armoring has resulted in decreased quality of nearshore habitat and resulted in a lack of eelgrass and macroalgae in the area. Eelgrass patches are present on the west side of Jetty Island and out into Possession Sound (DNR 2017).

The East Waterway is situated south of Naval Station Everett and west of Everett. The Port's marine terminals are located within the waterway. The waterway has been historically dredged in certain areas including the COE's navigation channels. Historic fill has resulted in very little aquatic habitat. Water quality within the waterway is degraded and includes a 303(d) listing for dioxin in water and for PAHs in sediment.

In the Snohomish County watershed, effects of climate change include saltwater intrusion into freshwater zones because of rising sea levels, longer and more intense winter flooding and earlier spring runoffs because of warmer temperatures. Terry Williams, a member of the Tulalip Tribes, stated that, in the Snohomish River Delta, 500-year floods are happening more frequently, along with early spring flooding and early drought (Seattle Times, 2015). In response to these issues, governments, tribes and nonprofits are working to restore and increase the storage capacity of flood plains and revive tidal wetland habitats. The tribes are working with farmers on a range of projects, including turning cattle manure into biogas, improving drainage on some farm land, and converting other acreage into fish habitat (Seattle Times, 2015).

Scientists from NOAA Fisheries, the Tulalip Tribes, and Snohomish County have been studying the Snohomish River system for over ten years to help inform the design of restoration actions that will be most effective. The largest restoration project so far, in the Snohomish River watershed, has been the Qwuloolt Estuary. About 1,500 linear feet of levee in the Snohomish River Estuary was removed which reopened 350 acres of historic wetlands to threatened salmon and other species (NWFSC 2017). To date, nearly 1,200 acres of Snohomish River tidal marsh estuary have been restored. This includes the Smith Island Restoration project, the Tulalip Tribe's Qwuloolt Estuary project, Port of Everett's Union Slough project, and Washington Department of Fish and Wildlife's Spencer Island Restoration Enhancement project.

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.

The COE proposes to permit the Port to conduct maintenance activities at numerous facilities within the Port. The effects of the proposed action include elevated sound levels, elevated sediment and contamination levels, and effects from fish handling.

2.5.1 Effects to the Species

Project Timing and Presence in the Action Area
The work window for this project is July 16 through February 15**.** Studies of ocean-type juvenile Chinook salmon in the Pacific Northwest indicate that they use estuarine and nearshore habitats early in their out-migration and rearing periods (Simenstad et al. 1982; Healey 1991). Juvenile Chinook salmon may begin migrating into estuaries and the nearshore in late January and early February, but peak migration occurs between mid-April and mid-July. Although we expect the majority of juvenile salmon to have left the estuary by the time construction begins, some juvenile salmonid use of estuarine rearing areas has been documented year-round (Rowse and Fresh 2003).

Adult Chinook salmon enter the Snohomish River system as early as May 1 to begin their upstream migration which could extend into October. Adult Chinook salmon are not nearshore dependent.

Juvenile steelhead outmigration occurs between February and October. At the point they enter marine waters they are not nearshore dependent and are heading quickly through the PS toward ocean waters. Adult return timing of summer steelhead stocks to the Snohomish River is generally May through October; winter steelhead return between November and April.

Pile Driving

Piles will be installed using vibratory and/or impact hammers operated from either the existing pier structures, from land, or from a barge depending on the project location and equipment access restrictions. Concrete piles (12- and 16-inch diameter) will be installed with an impact hammer only. Steel pile installation will be performed using a vibratory hammer. The majority of the steel replacement piles will be 12- or 16-inch diameter. At Central Marina, where three multi-pile dolphins need to be replaced, three 12-inch steel piles or a single 36-inch pile would be used to replace each dolphin. If there are steel piles that can be driven in the "dry" when the tide is out, an impact hammer may be used.

The type and intensity of the underwater sounds produced by pile driving depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate and depth of water into which the pile is being driven, and the type and size of the pile-driving hammer (Nedwell and Edwards 2002). In general, driving steel piles with an impact hammer appears to generate pressure waves that are more harmful than those generated by impact-driving of concrete or wood piles, or by vibratory installation of any type of pile. Sound pressure levels (SPLs) associated with installation of concrete and wood piles are characterized by a longer rise time than those of steel piles. Rise time appears to be an important factor in whether or not a sound pressure wave is likely to cause physical injury (Carlson *et al.* 2001, Nedwell and Edwards 2002). To date, we are not aware of any situations where installation of concrete or wood piles has been shown to cause injury or mortality in aquatic organisms. As such, we do not expect that the SPLs associated with impact installation of concrete or wood piles to cause injury to fishes.

The sound pressure waves from vibratory pile driving are much shallower and do not result in physical injury. Vibratory hammers produce sound pressure levels approximately 17 dB below those produced by impact hammers (Nedwell and Edwards 2002), and injurious effects from vibratory pile driving have not been reported from any empirical study of which the NMFS is aware. Based on this, the direct effects of sounds from vibratory pile driving are not expected to cause injury to fish.

All in-water pile installation will be conducted during the approved in-water work window (16 July to 15 February) when juvenile salmon are not expected to be in the area. We do not expect adverse behavioral effects on adult salmon from pile driving because adults are not expected to be foraging or milling in the construction area but are expected to be moving quickly upriver through the action area to spawning habitat.

<u>Suspended Sediments</u>

Pile driving causes short-term and localized increases in turbidity and total suspended solids (TSS). The effects of suspended sediment on fish increase in severity with sediment concentration and exposure time and can progressively include behavioral avoidance and/or disorientation, physiological stress (e.g., coughing), gill abrasion, and death—at extremely high concentrations. Newcombe and Jensen (1996) analyzed numerous reports on documented fish responses to suspended sediment in streams and estuaries, and identified a scale of ill effects based on sediment concentration and duration of exposure, or dose. Exposure to concentrations of suspended sediments expected during the proposed pile driving could elicit sublethal effects such as a short-term reduction in feeding rate or success, or minor physiological stress such as coughing or increased respiration. Studies show that salmonids have an ability to detect and distinguish turbidity and other water quality gradients (Quinn, 2005), and that larger juvenile salmonids are more tolerant to suspended sediment than smaller juveniles (Servizi and Martens, 1991; Newcombe and Jensen, 1996).

Very little data exists regarding the temporary increase in suspended sediment associated with pile driving. To estimate the magnitude of suspended sediment associated with the proposed pile driving, NMFS reviewed results from a vibratory pile removal project near the mouth of Jimmycomelately Creek in Sequim Bay (Weston-Solutions, 2006) and Newcombe and Jensens (1996) 'scale of ill effects' to determine likely associated biological responses. The maximum increase in TSS reported in Weston Solutions (2006) was 83 mg/L. According to Newcombe and Jensen (1996) juvenile salmon would need to be exposed approximately two hours with an increase in TSS over background of up to 240 mg/L, to exceed a behavioral effect of short-term reduction in feeding rates and feeding success.

Any elevations in turbidity and TSS generated by the pile driving will be localized, short-term and similar to the variations that occur normally within the environmental baseline of the riverine environment—which is regularly subject to strong winds and currents that generate suspended sediments. Thus, the juvenile salmonids likely will have encountered similar turbidity before. Furthermore, turbidity caused by the proposed action will quickly dissipate as sandy material will quickly drop out of the water column and finer material will be diluted by riverine and tidal flow.

Breakwater Repairs

Approximately 310 linear feet of timber breakwaters will be repaired or replaced with high-density polyethylene (HDPE) composite lumber or steel. The repaired breakwaters will be constructed using either a steel sheet pile wall, pipe piles with infill panels, or pre-stressed, precast concrete piles spaced closely together to form a wall. Sheet piles and pipe piles will be driven with a vibratory hammer, and the solid concrete piles will be driven with an impact hammer. The breakwater is located at 0.0 MLLW and replacement of a breakwater, including demolition and construction aspects, will occur during low tides to minimize in-water work.

Breakwaters are self-supporting structures that offer protection to a backshore area, generally with the intent to dissipate wave energy and create calm water behind the structure (Thom and Williams, 2001). The proposed repairs are for wall-type breakwaters that are constructed of pile supported panels that allow navigation up to their edge, have a small footprint that minimizes damage to bottom habitat, and are open near the bottom to allow circulation and fish passage. One study (Iannuzzi et al. 1996) estimated that microalgal and macroalgal primary productivity decreased after breakwater construction, however, the structures resulted in a net increase in the availability of substrates for micro- and macroalgal colonization (Thom and Williams, 2001).

Breakwaters can inhibit or alter migration in situations where the structure is placed in a migratory pathway or exposes juveniles to predators in deepwater habitats. Because adult Chinook and steelhead are not nearshore-dependent, we expect limited exposure to the habitat effects for these species. Juvenile PS Chinook salmon are the most likely to experience the long-term effects (migratory delay or risk of predation) from habitat modifications associated with the presence of these structures.

Coffer Dam Installation

Two different type of coffer dams will be used for construction activities. For repair to a boat ramp between mean sea level and MHHW, where cast-in-place concrete or flowable grout is to be used, a cofferdam may be used to perform the construction in the dry. The cofferdam will consist of a sandbag wall constructed in the dry (during low tide) on the lower portion of the existing boat launch surface. Because the construction of the sandbag coffer dam will be done in the dry, is unlikely fish will be stranded or adversely affected by the installation.

A different cofferdam system will be incorporated for sheet pile bulkhead coating repairs below MLLW to remove tidal influence from repairs. The cofferdam will either extend down to mudline or be hung off the side of the existing bulkhead and contain an interior floor. During installation and dewatering, fish may be stranded in the coffer dam. Any individual fish present in the work isolation area will be captured and released. Techniques will include the use of dip nets to capture and relocate fish.

The primary dewatering would be performed with pump intakes that prevent harm to fish by using small mesh screens over a large area to limit flowrate through a unit area of mesh. This is the method used for all water intakes where fish are present, whether in a graving dock or an intake from a body of water for process water. Once the cofferdam is dewatered down to a foot or two, biologists (or other appropriately qualified person) would enter the cofferdam and collect and release any fish present within the coffer dam. After the fish are collected, the cofferdam dewatering would be completed.

Although negative biological effect of the proposed action on listed species will likely be caused by the isolation of in-water areas, lethal and sublethal effects would be greater than without isolation.[1] In-water work area isolation is itself a conservation measure intended to reduce the adverse effects of construction effects on the population. Capturing and handling all fish causes them stress, though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived (NMFS 2002). Stress on salmonids increases rapidly from handling if the water temperature exceeds 18^{o}C (64^{o}F) or dissolved oxygen is below saturation.

For the Smith Island restoration project (located just north of the Port area), Walls (2011) calculated a smolt density between March and June to estimate likely densities that would be present at the peak of the outmigration. The average maximum Chinook smolt density from multiple studies was 0.21 smolts per acre (5200 smolts/hectare). Because of proximity to the project site we find this to be an adequate number to use. To determine how many smolts may be affected by coffer dam installation, we assume a six-foot width and a length of 20 or 25 feet depending on the size. The 20-foot coffer dam will be installed 55 times which equals 6,600 square feet of affect. The 25-foot coffer dam would be installed 42 times equaling 6,300 square feet of affect. Adding these together and converting to acres we come out with 0.3 acres of affect. Multiplying acres by smolt density we calculate that 0.63 juvenile fish would be captured during isolation activities. This is a conservative estimate as work will not be performed during peak outmigration.

Of the ESA-listed species considered in this opinion, only juvenile salmon are likely to be captured during work area isolation. Adult salmon and steelhead that may be present when the

[1] In 2007, Oregon Department of Transportation completed 36 work area isolation operations involving capture and release using nets and electrofishing; 12 of those operations resulted in capture of 0 Chinook salmon, 345 coho salmon, and 22 steelhead; with an average mortality of 5% Cannon (2008). Cannon (2012) reported a mortality rate of 4.4% for 455 listed salmon and steelhead captures during 30 fish salvage operations in 2012 (NMFS 2014).

in-water work area is isolated are likely to leave by their own volition, or can otherwise be easily excluded without capture or direct contact before the isolation is complete. To minimize the adverse effects of isolation and fish handling, all work will be performed within the in-water work window (July 16-February 15) when juvenile fish are least likely to be present. If juvenile salmon are present in the construction area, they reasonably certain to experience stress during handling. Because they will be exposed to increased stress, fish exposed are reasonably certain to be injured or killed.

Creosote pile removal

Over the ten years of the proposed action, the project would remove 898 piles (they would also be replaced), many of them being creosote treated timber piles. Water column concentrations of polyaromatic hydrocarbons (PAHs) from removal of creosote pilings are not expected to reach levels that would affect ESA listed species during demolition. Weston (2006) reported that during pulling of creosote pilings at the site of an old log yard operation, elevated PAH concentrations in-water persisted for five minutes after the piles were pulled before returning to background levels and that all measured water quality concentrations stayed below the Washington State standards of 300 parts per billion. Also, a post-removal human health risk assessment was conducted for residual sediment contamination using PAH concentrations in clam tissues. After piling removal, PAHs were either not detected, or were detected at very low concentrations in clams collected from intertidal locations in the vicinity of the former log yard and control sites.

In general, most non-benthic fish tissue contains relatively low concentrations of PAH, and accumulation is usually short term because these organisms can rapidly metabolize and excrete them (Lawrence and Weber 1984 and West et al. 1984 as cited in Eisler 1987). Once fish enter large rivers or become pelagic in marine waters the potential to be adversely affected by creosote-treated wood contaminants is very low (Poston 2001). However, creosote-treated pilings have the potential to impact sensitive species which lay their eggs on the pilings (e.g. Pacific herring) or occur in the immediate vicinity of pilings, where the PAHs accumulate in the sediments (Vines et al. 2000, Heintz et al. 1999 as cited in NOAA Fisheries SWR 2009).

Creosote pile removal is not expected to reach levels that would affect ESA-listed fish, contamination will quickly disperse, and will occur when juvenile PS Chinook salmon are least likely to be in the area. Adult Chinook salmon and steelhead will avoid areas of construction. Therefore, we do not expect that ESA-listed fish will be adversely affected by pile removal. In the long-term, removal of the creosote piles would benefit prey species through improved sediment and water quality.

Treated Wood

Wet ACZA-treated wood proposed for use in this project may leach 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).

In freshwater, exposure to dissolved copper concentrations between 0.3 and 3.2 µg/L above background levels can cause avoidance of an area, reduce salmonid olfaction, and induce behaviors that increase juvenile salmon's vulnerability to predators (Giattina et al. 1982; Hecht et al. 2007; McIntyre et al. 2012; Sommers et al. 2016; Tierney et al. 2010). However, dissolved copper's olfactory toxicity in salmon diminishes quickly with increased salinity. Baldwin (2015) reports no toxicity at copper concentrations below 50 µg/L in estuarine waters with a salinity of 10 parts per thousand (ppt). Sommers et al. (2016) report no copper-related impairment of olfactory function in salmon in saltwater.

Brooks (2004) reports that AZCA-treated wood used for in- and over-water marine structures caused no 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). Therefore, the expected dissolved copper concentrations at the project site is expected to be well below the threshold of effect in salmonids.

Contamination

Due to the highly industrialized nature of the project area, numerous sites (Central Marina, Dunlap, Pier 3, Hewitt Wharf, Pier 1, Pacific Terminal, and South Terminal) contain hazardous substances. Contaminants in sediments and dissolved in water can have varying levels of toxicity, most often occurring as sub-lethal effects. Pile replacement in these areas will be completed in accordance with the required BMPs for those sites (such as turbidity monitoring to ensure minimal sediment disturbance). Pile replacement will consist of pile removal, placement of clean sand on the substrate (to three times the diameter of the removed pile) in the footprint of the new pile prior to installation. The Washington State Department of Ecology 401 Water Quality Certificate Water Quality Monitoring Plan for this project requires that elevated turbidity be contained within a 150-foot compliance boundary and a 300-foot background area.

Juvenile Chinook salmon can be found in very low numbers in the Everett waterfront during the construction season. Adult Chinook salmon and steelhead will avoid areas of construction. We expect contaminant concentrations, associated with sediments, to increase during pile installation and removal activities with potentially harmful increases contained within 300-feet of construction activities.

Bulkhead Repairs

Riprap at multiple facilities will be supplemented to prevent further erosion. No increase in coverage of riprap will occur below MHHW or OHWM. Approximately 4,885 cubic yards of rip rap (0.5 cubic yards per linear foot) will be placed over 9,770 linear feet of existing riprap bulkhead. If a habitat bench is present on the slope, the bench will be maintained with the repair and a layer of fish rock will be placed over the bench. Any elevated levels of turbidity, or benthic disturbance associated with in-water construction activities would be minimized by the proposed BMPs, and are expected to be minor, localized and short-term.

Bulkheads, while they can be useful for property protection, have a number of well documented detrimental side effects. Hard vertical structures on the beach are known to steepen the beach slope and harden beach sediments over time, reducing available habitat for forage fish spawning and reducing available habitat and prey items for juvenile salmon. Other effects include removal of overhanging vegetation, cutting off of sediment supplies that create and maintain beaches, and degrading adjacent beaches that are not armored (including, but not limited to, increasing erosion at those neighboring sites). Juvenile food production and feeding—changed wave energy regimes can affect the production of prey by altering substrate conditions, water properties, and hydrologic conditions; can alter the flow of nutrients and detritus accumulation used by prey resources (Thom and Williams, 2001).

Although the existing bulkhead structures will continue to cause negative impacts to intertidal and nearshore habitat availability and function, we determined that the repair was not significant enough to meaningfully extend the life of these structures. To determine if an action extends the life of a structure, we considered the portion of the structure being replaced, the current condition of the structure, and what would likely occur if the proposed action did not take place. Because there are various types of armored slopes across the Port facilities (armor with habitat bench built in, armor in the marinas, armor at the terminals, and armor at the base of a vertical bulkhead wall), an average was calculated. The combined average existing slope volume is seven cubic yards per linear foot. With the proposed repair of 0.5 cubic yards per linear foot, the repair is 7.1 percent of the total structure and therefore, not significant enough to extend the life of the bulkhead.

Because adult Chinook salmon and steelhead are not nearshore-dependent, we expect limited exposure to the nearshore habitat effects for these species. Juvenile PS Chinook salmon are the most likely to experience the long-term effects (loss of forage) from habitat modifications associated with the presence of these structures.

<u>Mooring Float Replacement</u>

The applicant will replace 150 floats (2.4 percent of total floats), remove or reconfigure 159 floats (2.5 percent of total floats) and 130 boat houses, and may permanently remove 686 floats if it is determined to be too costly to repair them. Approximately 6,380 floats presently exist in the Port's marinas. Approximately 346,460 square feet of structures will be removed and 24,000 square feet of floats will be replaced. Through replacement, the proposed action will extend the life of many of the floats. The proposed action will also decrease overwater coverage by 114,820 square feet. To reduce the effects on primary production, the Port is proposing to install composite grating to the new timber floats to allow light penetration. The greatest direct effects from float repair and replacement is increased suspended sediments during construction which is described in the appropriate sections above.

Indirect effects of overwater structures and associated activities can impact ecological functions of habitat by altering those controlling factors that support key ecological functions such as spawning, rearing, and refugia (Nightingale and Simenstad 2001). It is hypothesized that overwater structures can cause long-term impacts to the biological community and the environment by altering predator/prey relationships, fish behavior, and habitat function. Shading, or the loss of ambient light to underwater environments, can reduce the abundance of phytoplankton, benthic macroalgae, and vascular plants such as eelgrass (Nightingale and

Simenstad 2001). These primary producers are an important part of the food webs supporting juvenile salmon and other fish in estuarine and nearshore marine environments. However, marina floats provide a substrate that is constantly wetted and just below the water surface, making them ideal for growth of marine algae and invertebrates that at least partially offset the lost benthic productivity (Kozloff 1993, Brandl et al. 2017). Overwater structures can also impact fish migratory behavior by creating sharp underwater light contrasts through the casting of shade under ambient daylight conditions and artificial night lighting changes (Nightingale and Simenstad 2001).

Heiser and Finn (1970) first documented a reluctance of juvenile salmonids to pass under docks. Since that time, more ambiguous results have been reported with some individuals passing under the dock, some pausing and going around the dock, schools breaking up upon encountering docks, and some pausing and eventually going under the dock (Nightengale and Simenstad 2001, Ono 2010 *et al.*, Munsch et al. 2014, Munsch et al. 2017). Juvenile salmonids use the upper layer of the deep water areas within marinas (Heiser and Finn 1970, Cardwell et al. 1980). In the sheltered waters of marinas, these fish seem to orient less to shorelines and shallow-water habitat, moving through surface waters along floats and in fairways, feeding actively on planktonic prey. No evidence has been reported that marinas in marine environments contain concentrations of predators that might prey on juvenile salmonids and some guilds of predators (e.g., gadids, diving birds) may be less abundant in marinas than along natural open shorelines (Heiser and Finn 1970, Cardwell et al. 1980). Nonetheless, it is recognized that shallow water habitat such as mudflats are important feeding areas for juvenile salmonids. Loss of such habitat must be avoided or minimized to the extent possible and replaced if some loss is unavoidable.

Clynick, (2008) reported that that artificial structures have a strong effect on fish spatial distributions. Cliynick (2008) also reported that fish are likely to be attracted to the marina since it provides a form of shelter, protection from predators and food source (Edgar, 1999; Mobley & Fleeger, 1999; Hixon & Beets, 1993 as cited in Clynick, 2008). Other studies have suggested that fish biomass increases in the presence of artificial structures such as marinas (Bohnsack, 1989; Fabi et al., 2004). Although dock pilings cannot function as a replacement for natural habitats, dock pilings may provide cost-effective means to preserve native vertebrate biodiversity, and provide a habitat that can be relatively easily monitored to track the status and trends of fish biodiversity in highly urbanized coastal marine environments (Brandl et al. 2017).

Juvenile salmon may experience a minor delay in migration after entering the marina. Beneficial effects will result from the permanent removal of 114,820 square feet of overwater coverage.

<u>Marina Boating Activity</u>

The proposed marina repair will facilitate moorage of recreational and commercial vessels, many of which are motorized. The use of watercraft increases noise, degrades water quality, and alters fish behavior. Increased background noise has been shown to increase stress in humans (Rehm *et al.* 1985) and other mammals (Owen *et al*. 2004). Several studies support that the same is true for fish (Mueller 1980, Scholik and Yan 2002, Picciulin *et al.* 2010). Recreational boat noise diminished the ability of resident red-mouthed goby (*Gobius cruentatus)* to maintain its territory (Sebastianutto *et al.* 2011). Depending on speed and proximity to nests, boats caused spawning long-eared sunfish to abandon their nests for varying periods in order to find shelter (Mueller, 1980). Xie *et al.* (2008) report on the common sense knowledge, that adult migrating salmon avoid vessels by swimming away. Graham and Cooke (2008) studied the effects of three boat noise disturbances (canoe paddling, trolling motor, and combustion engine (9.9 horsepower) on the cardiac physiology of largemouth bass (*Micropterus salmoides*). Exposure to each of the treatments resulted in an increase in cardiac output in all fish, associated with a dramatic increase in heart rate and a slight decrease in stroke volume, with the most extreme response being to that of the combustion engine treatment (Graham and Cooke 2008). Recovery times were the least with canoe paddling (15 minutes) and the longest with the power engine (40 minutes). They postulate that this demonstrates that fish experienced sublethal physiological disturbances in response to the noise propagated from recreational boating activities. Even though the NMFS did not find studies exploring the physiological effects on salmon, it is reasonable to assume, that juvenile and adult salmon, in addition to avoiding boats (Xie et al. 2008) experience sublethal physiological stress.

Given the likely high background levels of noise in and around the Everett waterfront, we expect effects on fish to remain sublethal and low level. The Everett waterfront has a high level of industrial and marina development with many piers, ramps and floats (PRFs) and associated motorized boat use. The motorized boat use within this waterway results in seasonally (summertime) high background noise levels from which it is likely hard to distinguish specific origin. Thus, we expect high background noise to often mask the subsequent boat noise associated with this marina. As a result we expect most of the project-related increase in noise to be indistinguishable from the background noise and thus their effects insignificant.

<u>Mitigation</u>

The proposed work also includes mitigation opportunities that will be completed as needed for any maintenance activities that increase overwater coverage or increase impacts to benthic habitat. The potential mitigation activities include removal of timber piles near the Jetty Island Docks, cleanup of debris below the MHHW near Pier 3, removal of select piers, a timber float, and a gangway structure. These mitigation activities would reduce overwater coverage, increase benthic habitat (e.g. through debris/pile removal, etc.) and improve nearshore habitat conditions. A total of seventeen 12-inch-diameter, creosote-treated timber piles may be removed at the Jetty Island Docks. Fifteen 12-inch-diameter, creosote-treated timber piles may be removed at the north notch of Pier 3, and a steel gangway access pier may be demolished at Pier 3. The Seiner Pier at the Central Marina and an open-deck finger pier at the Dunlap Facility may be demolished. Float removal may be used as a credit for possible float enlargement elsewhere in the marina. If needed, there are more than one hundred 12-inch-diameter creosote-treated timber piles that may be removed from the waterfront area near the Riverside Business Park on the Snohomish River. Additionally, the Port may opt to use credits from the Union Slough Advance Credit Restoration area as mitigation for maintenance activities.

Overall, mitigation will address limiting factors described in the Recovery Plan (Shared Strategy for Puget Sound 2007, NMFS 2006) that are recognized to decrease individual fitness, survival, and productivity of salmonid populations. Removing over-water coverage and structures will restore the habitat-forming process in the degraded nearshore areas. Removing creosote pilings will improve water and sediment quality. The improved habitat will increase food abundance and will in times of food limitation translate into increase growth, individual fitness, and survival. Thus, we are reasonably certain, that the mitigation will offset some of the losses that likely will be incurred from indirect and direct effects related to the maintenance activities being permitted.

Summary of Effects to Salmonid Population Viability
We assess the importance of habitat effects in the action area to the ESUs by examining the relevance of those effects to the characteristics of VSPs. The characteristics of VSPs are sufficient abundance, population growth rate (productivity), spatial structure, and diversity. While these characteristics are described as unique components of population dynamics, each characteristic exerts significant influence on the others. For example, declining abundance can reduce spatial structure of a population; and when habitats are less varied, then diversity among the population declines.

Abundance. In addition to the construction-related effects that will affect only the fish that may be present during the construction, the existing Port facilities have long-term effects on the estuarine and marine nearshore environment. These effects result in obstruction of fish movement and potential reduction in food supply from over-water structures and shoreline modifications. They mostly apply to juvenile PS Chinook salmon which migrate or rear in the nearshore area. These habitat changes, which will persist for the duration the Port is in place, will result in an incremental increase in stress and reduction in foraging success. Effects to individual fish will occur among an undetermined percentage of all future cohorts of the two populations that use the action area.

While we cannot quantify these long-term structure-related effects, we believe them to be limited and proportional to the size of affected habitat. We expect this degradation in habitat to result in a long-term, but very small decrease in abundance among the two populations of PS Chinook that encounter the dredged area. Because PS steelhead do not use the estuarine or marine nearshore habitat, we do not expect the proposed project to effect the abundance of PS steelhead.

Productivity. The existing structures will permanently and incrementally degrade nearshore habitat conditions. In response to the degraded habitat, we expect juvenile salmonids will experience reduced foraging success and increased energy expenditure. All these effects, independently or in combination, are likely to lead to proportional decreases in individual fitness and survival. The permanent changes to the nearshore environment are expected to exert a sustained downward pressure on estuarine habitat function in the PS and, proportionally to the relatively small amount of habitat affected, reduce the rearing and foraging capacity of the action area.

Because PS steelhead do not use the estuarine or marine nearshore habitat, we do not expect the proposed project to affect the productivity of PS steelhead.

Spatial Structure. We do not expect the proposed project to affect the spatial structure of any of the two affected PS Chinook ESUs or the five Demographically Independent Populations (DIPs) of Snohomish basin steelhead. Salmonid populations spread across the nearshore and mix when they enter tidal waters (Fresh et al., 2006). This project will likely not disproportionately affect any one population.

<u>Diversity.</u> Salmon have complex life histories and changes in the estuarine environment will have a greater effect on specific life history traits that make prolonged use of this habitat. This will likely result in a slight, proportional to the limited habitat alteration, decline in PS Chinook diversity by differentially affecting specific populations that encounter the developed area in greater frequency during their early estuarine life history. We do not expect the proposed project to effect the diversity of PS steelhead.

2.5.2 Effects on Critical Habitat

The NMFS designated critical habitat for the Puget Sound Chinook salmon on September 2, 2005 (70 FR 52630). One of the six PBFs of Puget Sound Chinook salmon critical habitat are in the action area:

The action area is located within the estuarine and marine PBF of PS Chinook critical habitat. The PBFs for PS Chinook salmon estuarine critical habitat are areas free of obstruction and excessive predation with:

(1) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (3) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

The PBFs for PS Chinook salmon marine critical habitat are areas free of obstruction with:

(1) Water quality and quantity conditions and (2) Forage, including aquatic invertebrates and fish, supporting growth and maturation; and (3) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

Obstruction

Migration will be disrupted due to the presence of the docks and breakwater.

Water quality

Although construction activities will increase suspended sediments and contaminants during project activities the effects will be short-term and return to pre-project levels as soon as construction activities cease. Water quality will improve with the removal of creosote treated timber piles and the placement of clean sand. The proposed action will have no impact on the water temperature needs of salmon in the Snohomish River or the Puget Sound.

Natural cover

There will be no affect to natural cover.

Forage

There will be a decreased quality of forage opportunity due to disturbance during construction. The effects will be short-term and return to pre-project levels as soon as construction. There will be long term effects to forage from existing structures and bulkheads.

2.6 Cumulative Effects

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

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

Restoration of another 420 acres of historic estuary is anticipated in 2019, with completion of Snohomish County's Mid-Spencer Island Restoration project and the Port of Everett's Blue Heron Slough project (Snohomish County 2018). The estuary is on track to have restored over 1,000 acres of the Salmon Recovery Plan's 10-year goal of 1,237 acres of tidally influenced habitat (NWIFC 2016). Even with these much-needed gains through restoration, recent trends demonstrate that net loss and degradation of key habitats continues (NWIFC 2016).

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

2.7 Integration and Synthesis

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

Abundance across the PS Chinook salmon ESU has generally decreased between 2010 and 2014, with only 6 small populations of 22 total populations showing a positive change in natural-origin spawner abundances. The PS steelhead DPS is currently considered “not viable”, and the extinction risk for most DIPs is estimated to be moderate to high. Long-term abundance trends have been predominantly negative or flat across the DPS, especially for natural spawners, and growth rates are currently declining at 3 to 10 percent annually for all but a few DIPs. The current status of the affected species is related to their degraded critical habitat and poor baseline condition. In general, baseline habitat conditions in the PS region have been degraded chiefly by human development. Approximately 70 percent of the Snohomish River basin nearshore shoreline has experienced significant modification and subsequent population declines in plant and animal species important for various salmon life stages. Sediment delivery and transport, riparian conditions, and intertidal habitat conditions have been extensively modified along the Snohomish nearshore, most notably due to construction of the Burlington Northern/Santa Fe railroad in the 1890s, construction of bulkheads, riprap, and piers in the industrial waterfront, and dredging of berths and the federal navigation channel (SBRSF 2005). The extent of these habitat modifications significantly impairs several aspects of critical habitat and puts its function for listed salmonids at risk.

To date, nearly 1,200 acres of Snohomish River tidal marsh estuary have been restored. Restoration of another 420 acres of historic estuary is anticipated in 2019, and the estuary is on track to have restored over 1,000 acres of the Salmon Recovery Plan’s 10-year goal of 1,237 acres of tidally influenced habitat. Even with these much-needed gains through restoration, recent trends demonstrate that net loss and degradation of key habitats continues.

Climate change is likely to exacerbate several of the ongoing habitat issues, in particular increased summer temperatures and decreased summer flows in the freshwater environment and ocean acidification and sea level rise in the marine. While currently the net balance of shoreline armoring seems to be somewhat stable with new armoring being offset by restoration actions, sea level rise adds pressure to increase future armoring in PS. More shoreline armoring along with other infrastructure projects designed to protect against flooding will likely reduce habitat quality for salmonids.

In summary, the status of the species and its habitat both are poor. The baseline conditions of habitat have been considerably degraded, mostly by human development. In addition to these already degraded conditions, the cumulative effects driven by development pressures from population growth and climate change will likely continue to adversely affect critical habitat and the species that depend on critical habitat functions. These cumulative effects will be related to commercial and residential construction and shoreline stabilization above the OHWM that currently is not regulated by the COE and thus does not have a Federal nexus. These habitat alterations may take place within critical habitat or influence critical habitat for listed species.

The number of adults and juveniles that are likely to be injured or killed due to the proposed action during short-term isolation activities are too few to cause a measurable effect on the long-term abundance or productivity of any affected population or to appreciably reduce the likelihood of survival and recovery of any listed species. Therefore, the proposed action will not reduce the productivity or survival of the affected populations of PS Chinook salmon and PS steelhead, even when combined with the environmental baseline and additional pressure from cumulative effects and climate change**.**

For salmon critical habitat, as summarized above, the proposed project will have limited short-term construction effects to nearshore critical habitat PBFs in the action area. The potential adverse effects of construction to PBFs are expected to be minor and persist for a short time during each construction year. The PBFs will recover their function quickly from construction activities, such that no conservation parameters will be diminished. The long-term adverse effects from over water coverage and shoreline modifications are reasonably certain to persist for the duration the Port exists. While measurable in the action area, on a critical habitat designation scale their effect will be small because only a small portion of available critical habitat in the Snohomish River watershed and marine shoreline will be affected. The effects in the action area would not combine synergistically with any past or ongoing actions to influence the conservation role of that corridor. Therefore, the action area changes will not negatively influence the conservation value of critical habitat at the action area scale.

Even though the baseline is degraded and cumulative effects likely will continue to adversely affect critical habitat, the added adverse effects of the proposed action are too small on a designation-level to appreciably reduce the conditions of critical habitat or preclude re-establishing properly functioning conditions. Overall, when added to the baseline and cumulative effects, the effects of the action on critical habitat do not significantly affect the conservation value of critical habitat at the designation scale.

For all the reasons described in the preceding paragraphs of this section, the proposed action will not appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction or distribution nor will the proposed action reduce the value of designated critical habitat for the conservation of the species.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of PS Chinook salmon, PS steelhead and/or destroy or adversely modify designated critical habitat for PS Chinook salmon.

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

The proposed action is likely to cause the injury or death of PS Chinook salmon and PS steelhead of the species considered in this Opinion as a result of:

1. Creation or continuance of habitat conditions that affect migration, increase predation, or impact prey resources.
2. Water quality effects during pile removal in contaminated sediments.
3. Juvenile fish handling and dewatering during work area isolation.

Juvenile life stages are most likely to be affected, although adults will sometimes also be present when in-water work windows do not exclude the entire adult migration period for all species.

The number of fish that will be exposed to adverse effects is difficult or impossible to estimate or monitor, given the variable presence of fish at any given time. Furthermore, individual exposed fish will respond variably to exposure such that only a portion of exposed fish can be predictably injured or killed in response to exposure. In such cases, NMFS uses a surrogate in the form of the extent of habitat modified to quantify the extent of take in this section.

The best available indicators for the extent of take are:

1. For harm associated with migratory delay, reduced level of forage, and/or predation on salmon, we used the area of nearshore that would be affected as a habitat surrogate. Because the effect on individual fish cannot be monitored, we define take for these effects based on the linear footage of breakwater structure (310 linear feet). If the proposed structures are constructed larger than this, the extent of take will be exceeded. This indicator is appropriate for this proposed action because the size of the breakwater structure is positively correlated with the effects to listed species from increased predation and migratory delays caused by the existence of the structure into the future.
2. For harm associated with migration delay and prey resource effects from overwater structures, we use the number of dock structures to be repaired as a habitat surrogate. Presently there are 6,380 existing floats, 150 floats are proposed to be replaced, 686 floats removed, and 159 floats and 130 boathouses will be removed or reconfigured. If more than 150 floats are replaced or there is an expansion of overwater coverage, take will be exceeded. This indicator is appropriate for this proposed action because the size of the overwater structure is positively correlated with the effects to listed species from a reduction in water quality, forage, and increased predation caused by the existence of the

structure into the future. This take indicator operates as an effective reinitiation trigger despite being somewhat coextensive with the proposed action because the Corps has authority to conduct post-construction compliance inspections and to take actions to address non-compliance (33 CFR 326.4).

3. For harm associated with elevated contaminate levels during pile removal, the area of take is 300 feet from ongoing activities. If water quality is exceeded by ten percent at the 300-foot boundary, the anticipated take will be exceeded.
4. NMFS does not anticipate that any adult salmon or steelhead will be captured as a result of work necessary to isolate in-water construction areas, although up to one juvenile salmon during coffer dam installation is likely to be captured. The average maximum Chinook smolt density from multiple studies was 0.21 smolts per acre (5200 smolts/hectare). Because of proximity to the project site we find this to be an adequate number to use. To determine how many smolts may be affected by coffer dam installation, we assume a six-foot width and a length of 20 or 25 feet depending on the size. The 20-foot coffer dam will be installed 55 times which equals 6,600 square feet of affect. The 25-foot coffer dam would be installed 42 times equaling 6,300 square feet of affect. Adding these together and converting to acres we come out with 0.3 acres of affect. Multiplying acres by smolt density we calculate that 0.63 juvenile fish would be captured during isolation activities. Therefore, we provide a conservative overestimate of take which is the capture and related handling of ten juvenile salmonids.

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

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

The COE shall require:

1. Permit conditions are applied regarding construction to avoid or minimize harm to ESA-listed species considered in this opinion.
2. The applicant shall ensure care is taken during isolation activities to minimize harm during fish handling.
3. The applicant shall ensure completion of a reporting program to confirm this Opinion is meeting its objective of limiting the extent of take and minimizing take from permitted activities. Please electronically send these reports to projectreports.wcr@noaa.gov.

2.9.4 Terms and Conditions

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

1. To implement reasonable and prudent measure No. 1, the COE shall require the applicant ensure that:
   a) Timing of in-water Work. All in water work, except for sediment sampling, will be completed between July 16 to February 15. Sediment sampling may occur year round.
   b) All in-water steel pile driving will only be done with a vibratory hammer.

2. To implement reasonable and prudent measure No. 2, the COE shall require the applicant ensure that:
   a) A trained fish biologist, with experience in work area isolation and that is qualified to ensure the safe handling of all fish, will be on site during isolation activities (coffer dam installation) where fish handling will be required.

3. To implement reasonable and prudent measure No. 3, the COE shall require the applicant:

   To submit an Annual Planning and Compliance Form (Appendix A) by March 30th of each year to document completed repair work and describe the anticipated activities for the following year. Mitigation requirements/and quantitative reporting of those activities completed for the previous year's work and associated with upcoming work will be described as appropriate in the annual report. The applicant must submit monitoring reports to: projectreports.wcr@noaa.gov

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).

To offset adverse effects of the action (decreased forage, increased predation, migration delay), NMFS recommends the Port look for opportunities to increase and restore nearshore habitat within the Snohomish River.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Port of Everett Maintenance Activities project.

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

2.12 "Not Likely to Adversely Affect" Determinations

The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Georgia Basin Rockfish
Bocaccio
Yelloweye

The likelihood of adults of ESA-listed rockfish occurring within the action area is discountable. Adult rockfish typically occupy waters deeper than 120 feet (Love et al., 2002) and are very unlikely to occur within the action area because it is less than 50 feet deep. There is no rockfish critical habitat in the action area.

Juvenile yelloweye rockfish are not typically found in shallow intertidal waters (Love et al., 1991). Yelloweye rockfish are most frequently observed in waters deeper than 30 meters (98 feet) near the upper depth range of adults (Yamanaka et al., 2006), and prefer rocky habitats. Because of the depth and substrate preference, it is extremely unlikely that yelloweye rockfish would be exposed to any of the effects of the proposed action. Therefore, we conclude that the proposed action will have discountable effect on yelloweye rockfish.

Juvenile bocaccio are known to settle onto rocky or cobble substrates in the shallow nearshore at 3 to 6 months of age in areas that support kelp and other aquatic vegetation, and then move to progressively deeper waters as they grow (Love et al., 1991; Love et al., 2002; Palsson et al., 2009). Juvenile bocaccio rockfish also recruit to sandy zones with eelgrass or drift algae (Love et al., 2002). Juvenile bocaccio are unlikely to be affected by construction activities as there is no suitable habitat or vegetation in the action area (DNR 2017).

We concur with the Corps that the proposed action is not likely to adversely affect GB yelloweye rockfish or GB bocaccio.

Southern Resident Killer Whale

The final rule listing Southern Resident killer whales as endangered identified several potential factors that may have caused their decline or may be limiting recovery. These are: quantity and quality of prey, toxic chemicals which accumulate in top predators, and disturbance from sound and vessel traffic. The rule also identified oil spills as a potential risk factor for this species (73 FR 4176). There is no critical habitat for SR killer whales in the action area.

Southern resident killer whales will not be exposed to the short term water quality effects of the action because the area affected by water quality disturbance will not disperse into areas they could be found. It is very unlikely that SR killer whales would be present within the industrial waterfront area of the lower Snohomish River where disturbance effects would occur. Thus, water quality effects on SR killer whale growth or development will be insignificant. Because a marine mammal monitoring plan will be implemented during pile driving (Appendix B) there will be no effects from elevated noise levels during pile driving. The proposed program may affect the quantity of their preferred prey, Chinook salmon. Any salmonid take will be very minor and the extent of take would result in an insignificant reduction in adult equivalent prey resources for SR killer whales that may intercept these species within their range. Finally, the construction will not affect migration.

Based on this analysis, NMFS concurs with COE that the proposed action is not likely to adversely affect the subject listed Southern resident killer whales.

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 COE and descriptions of EFH for Pacific Coast groundfish (Pacific Fishery Management Council [PFMC] 2005), coastal pelagic species (CPS) (PFMC 1998), and Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The action area overlaps with identified EFH for Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species.

3.2 Adverse Effects on Essential Fish Habitat

- Construction-related impacts to water quality will be primarily from contaminated sediment disturbance during construction activities. Contaminants in sediments and dissolved in water can have varying levels of toxicity, most often occurring as sub-lethal effects.

3.3 Essential Fish Habitat Conservation Recommendations

Although NMFS expects construction activities to generate contaminated suspended sediments, which are sufficient to reduce the quality of EFH for EFH species, the proposed action includes the best-known technology for minimizing suspended sediments, and there are no reasonable measures to further reduce the level of these effects. Therefore, NMFS does not recommend any additional measures to address this effect.

Because the conservation measures, mitigation, and BMPs that the Corps included as part of the proposed action to address ESA concerns are also adequate to avoid, minimize, or otherwise offset adverse impacts to EFH, additional conservation recommendations pursuant to MSA (§305(b)(4)(A)) are not necessary.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the COE 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 COE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the COE. Other interested users could include the Port of Everett and other interested individuals. Individual copies of this opinion were provided to the COE. The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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APPENDIX A. Compliance Form From the Port of Everett Biological Evaluation

Appendix B – Compliance Form

PORT OF EVERETT PROGRAMMATIC MAINTENANCE AND UPGRADES

Corps Reference #:
NMFS Reference #:
FWS Reference #:
Reporting Period:
Date of Report:
Report Preparer:

By March 15th of each year in which work under the above referenced permit is conducted, this compliance form will be filled out, signed and submitted to: U.S. Army Corps of Engineers, Regulatory Branch, P.O. Box 3755, Seattle, WA 98124-3755.

1. Permittee:

   Port of Everett
   1205 Craftsman Way
   Everett, WA 98201

2. Summary of 20XX completed work:

Site/Facility	Maintenance/Upgrade Activities Conducted	Mitigation Activities Conducted
	1. 2. 3.	1. 2. 3.
	Add additional rows as necessary	

3. Summary of 20XX anticipated work:

Site/Facility	Maintenance/Upgrade Activities Conducted	Mitigation Activities Conducted
	1. 2. 3.	1. 2. 3.
	Add additional rows as necessary	

APPENDIX B. Marine Mammal Monitoring Plan Port of Everett Programmatic Maintenance and Repair

This marine mammal monitoring plan (MMMP) has been prepared for the Port of Everett for use during pile installation and removal associated with the programmatic maintenance and repair activities within the Port's waterfront facilities. The Port is proposing to complete these maintenance activities as needed over the next 10 years under a programmatic permit. The repairs and demolition will occur within approved in-water work windows over the course of a 10-year permit lifetime. Marine mammal monitoring will only occur for in-water steel pile-driving activities, including removal and installation, as these activities have the greatest potential to affect marine mammal species protected under the Endangered Species Act (ESA). Monitoring will not occur if steel piles are driven in dry work areas, such as low-tide situations.

A vibratory hammer or excavator type of equipment will be used for all pile removal and for installation of steel piles to the greatest extent possible. The majority of pile installation will be completed with a vibratory hammer. The project will use an impact hammer to drive steel piles to their final tip elevations, if necessary, following vibratory driving to refusal (the point at which the pile will no longer advance with the vibratory hammer). An impact hammer may also be needed to proof the piles (to confirm load-bearing capacity) where necessary for structural piles. The proposed maintenance activities do not include many structural pile replacements at this time, and proofing activities are expected to be minimal over the course of the 10-year project time frame. Impact hammers will also be used to install timber and concrete piles, Monitoring is not proposed for timber or concrete piles as these materials do not result in underwater noise levels that are expected to harm or harass marine mammals.

Underwater noise levels within portions of the action area could temporarily exceed the noise thresholds established by National Oceanic and Atmospheric Administration (NOAA) Fisheries to prevent the underwater disturbance of ESA listed marine mammals during vibratory and impact driving of steel piles. A bubble curtain will be required during all in-water impact driving of steel pipe pile. This monitoring plan conservatively assumes that use of a bubble curtain will reduce underwater noise levels by 6 dB. This plan refers to these portions of the action area as the "impact temporary effect area" and the "vibratory temporary effect area".

All in-water pile removal and installation will be conducted during the agency-established in-water work window for marine waters of Puget Sound where bull trout are present (16 July to 15 February). Southern Resident DPS orca whale (*Orcinus orca*) and Eastern North Pacific Stock humpback whale (*Megaptera novaeangliae*), the two marine mammals listed under ESA, could potentially be present within portions of the action area during the time when pile installation and/or removal is being conducted, as described in the Biological Evaluation (BE) completed for the project.

The Port has an existing MMMP for pile replacement at Piers 1 and 3, the South Terminal, and the Hewitt Terminal (Hart Crowser 2015). This MMMP proposes a similar monitoring protocol to be implemented for the duration of the programmatic maintenance permit for the Port's facilities. Pile installation and removal are the only activities planned under the programmatic maintenance project that will require marine mammal monitoring.

This MMMP will be conducted during all steel pile installation and removal activities for the project. As described in the plan, no pile installation or removal will be conducted if ESA-listed marine mammals are present within the monitoring areas.

Monitoring Areas

Monitoring areas have been established separately for North Zone and South Zone projects at the Port (Figure 1). The North Zone is sheltered behind Jetty Island and is likely to have less exposure to marine mammals. The South Zone is more exposed to Possession Sound and will require a larger marine mammal monitoring area. For each zone, marine mammal monitoring will occur within two areas as established by NOAA Fisheries guidance on the effects of underwater sound on marine mammals, depending on the type of hammer used (Table 1). The Port will require the use of a bubble curtain during all impact hammer activities to reduce the amount of underwater noise generated during construction. This analysis assumes a 6 dB reduction will be achieved by the bubble curtain.

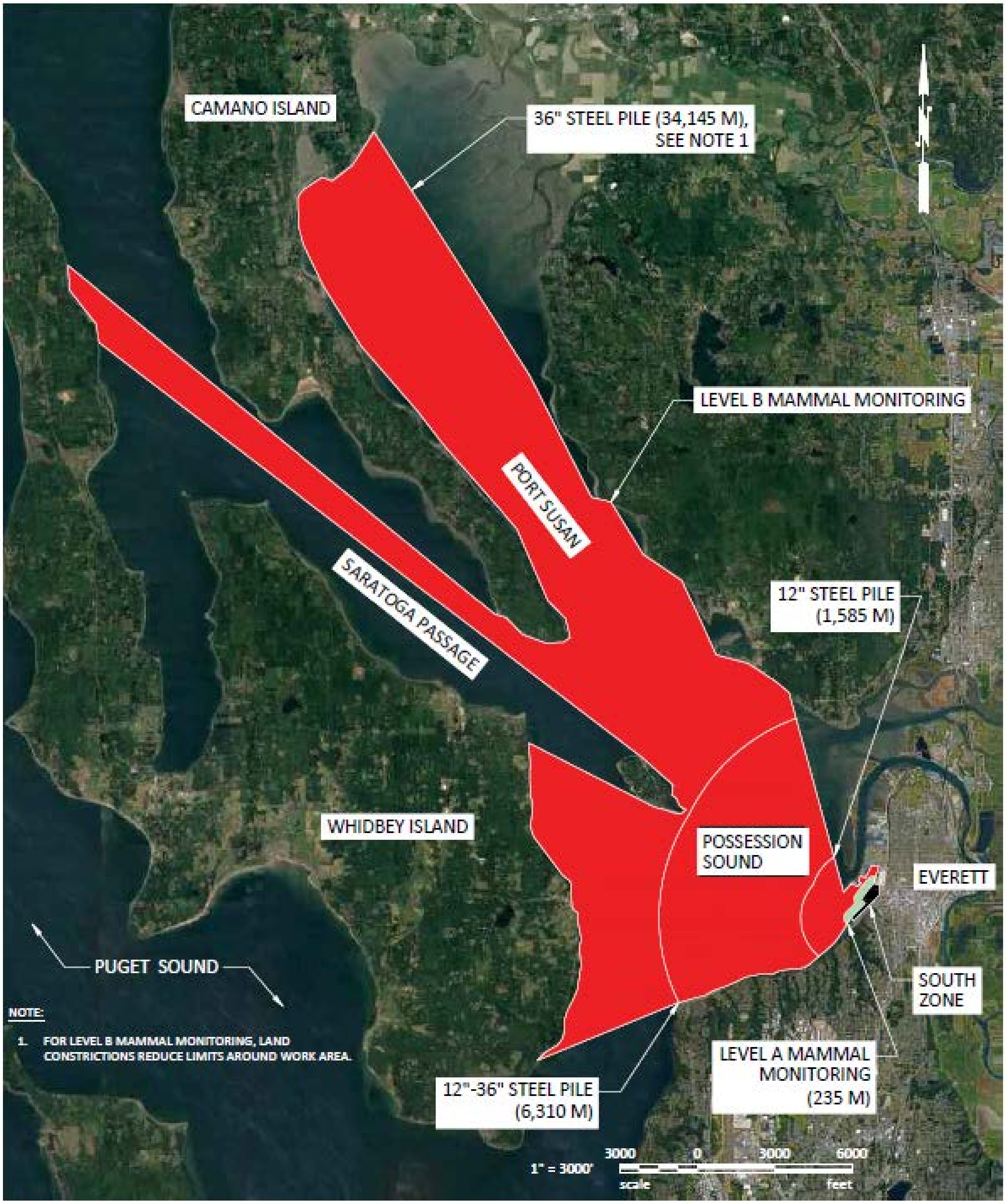

Figure B-1. Marine Mammal Sound Monitoring Area

Table 1. Summary of Hammer Noise Levels Used for Calculating Monitoring Zones

Driving Method	Pile Size/Material	Measured Noise Levels (dB) at 10m[a]		
		Peak	SEL	RMS
Vibratory	36-inch Steel Pipe	185	175	175
Impact (unattenuated)	20-inch Steel Pipe[b]	204	178[c]	161
Impact (attenuated)	20-inch Steel Pipe	198	172	155

a- Noise information compiled from CALTRANS 2012.

b- The largest pile subject to impact driving is 18-inch steel pipe. The available scientific literature does not contain measured levels for this type of pile. Therefore a 20-inch steel pipe pile was used as a surrogate. The larger pile provides a factor of safety compared to actual pile sizes in the noise analysis.

c- SEL data for 20 inch piles is not available. Data is provided for a 24-inch steel pipe pile, the next largest, measured pile.

Monitoring will be conducted for Level A and Level B harassment areas. Table 1 shows the Level A underwater injury and disturbance thresholds that NOAA Fisheries has established for marine mammals. Table 2 depicts the criteria for Level B harassment. Humpback whales are considered to be Low-Frequency Cetaceans and orca are Mid-Frequency Cetaceans. In order to account for all ESA-listed species, the distances for Low-Frequency Cetaceans will be used to establish monitoring areas as they are more restrictive.

Table 2. Level A Harrassment Threshold Decibel Levels (Permanent Temporal Shift [PTS]) for Marine Mammals

Marine Mammal Hearing Group	Impulsive Sounds (impact driving)	Non-impulsive Sounds (vibratory drving)
Low-Frequency (LF) Cetaceans	219 dBpk 183 dBLe	199 dBpk
Mid-Frequency (MF) Cetaceans	230 dBpk 185 dBLe	198 dBpk
High-Frequency (HF) Cetaceans	202 dBpk 155 dBLe	173 dBpk
Phocid Pinnipeds (PW) (Underwater)	218 dBpk 185 dBLe	201 dBpk
Otariid Pinnipeds (OW) (Underwater)	232 dBpk 203 dBLe	219 dBpk

Source: NOAA Fisheries 2016
dBpk - peak noise level
dBLe - cumulative noise level averaged over a 24-hr period

Table 3.Level B Harrassment Threshold Decibel Levels for Marine Mammals

Criterion	Criterion Definition	Threshold*
Level B Harassment	Behavioral disruption for impulsive noise (e.g., impact pile driving)	160 dB_{RMS}
Level B Harassment	Behavioral disruption for non-pulse noise (e.g., vibratory pile driving, drilling)	120** dB_{RMS}

All decibel levels referenced to 1 micropascal (re: 1 µPa). Note: all thresholds are based off root mean square (RMS) levels.
* PTS=Permanent Threshold Shift; TTS=Temporary Threshold Shift
**The 120 dB threshold may be adjusted slightly if background noise levels are at or above this level. For the Port of Everett, background is assumed to be 122 dB as described in section 3.5.2 of the BE.

The Level A harassment threshold for ESA-listed marine mammal species could be exceeded during impact pile-driving/proofing activities at various distances for each hearing group (Table 3). The analysis in section 3.7.2.1 of the BE (BergerABAM 2017) indicates that 172 dBSEL is a conservative estimate of the sound levels likely to be produced during impact pile driving of 20-

inch steel pile, including a 6 dB reduction from the use of a bubble curtain. In order to protect ESA-listed species, an impact monitoring zone of 159 meters has been established for the Level A impacts during impact pile driving.

Table 4. Monitoring Distance Threshold for Level A Harassment to Marine Mammals during Impact Pile Driving

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	159.0	5.7	189.4	85.1	6.2

Source: NOAA Fisheries 2016, single strike SEL method

Level B harassment is defined as the area where under water noise exceeds 160 dB_{RMS} for impact driving. Underwater noise generated by impact hammers for the modeled 20-inch steel pipe pile would result in an attenuated noise level of 155 dB_{RMS}. Under the typical scenario of less than 150 strikes per day, the 160 dB_{RMS} threshold for Level B harassment would not be exceeded and no monitoring would be required.

The analysis in section 3.7.2.2 of the BE (BergerABAM 2017) indicates that 175 dBRMS is a conservative estimate of the sound levels likely to be produced during vibratory pile removal and installation of up to 36-inch-diameter steel pile. In order to account for all potential ESA-listed marine mammals, a vibratory monitoring zone of 769 feet (234.3 meters) has been established for the Level A impacts ***(Sheets 43 and 45).***

Table 5. Monitoring Distance Threshold for Level A Harrassment to Marine Mammals during Vibratory Pile Driving

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	234.3	20.8	346.4	142.4	10.0

Source: NOAA Fisheries 2016

Level B harassment is defined as the area where under water noise exceeds 120 dB_{RMS}. As described in the BE, background noise level exceed this threshold and typical noise within the project area is 122 dB. Underwater noise generated by vibratory hammers is dependent on the diameter of the pile being installed. Table 5 describes monitoring zones for pile size classes based on available data. Attenuation will actually occur much sooner, because sound waves travel in straight lines and the monitoring area is constrained by existing jetties, breakwaters, and other land masses that effectively block propagation of underwater noise.

Table 6. Monitoring Distance for Level B Vibratory Hammers

Pile Diameter Range	dB_{RMS}	Monitoring Zone
36" and greater steel pipe	175	34,145m
12-24" steel pipe[a]	165	6,310m
12" or less steel pipe	155	1,585m

Source: WSDOT 2012

The Level A and Level B areas will be monitored according to the protocol described in this plan for any in-water pile installation or removal activity associated with this project. These monitoring areas will be maintained as injury and disturbance protection zones to prevent injury to, or disturbance of ESA-listed marine mammals. Pile-driving activities will be shut down immediately if any marine mammals are observed within or entering the Level A or B monitoring area.

Annual Planning
The Port of Everett will provide an annual work plan to the U.S. Army Corps of Engineers (USACE) and to NOAA Fisheries 30 days prior to the start of each annual in-water work window. The work plan will specify the activities and schedule the Port intends to accomplish during the in-water work window. The work plan will include defined marine mammal monitoring areas for each activity, including the type of hammer(s) used and pile size, if applicable, and will reflect the actual project location(s) and protocols needed to effectively monitor for marine mammals.

Annual Reporting
The Port of Everett will provide a brief work summary to the USACE and to NOAA Fisheries within 30 days of the end of an in-water work period. The summary will include a description of the work completed within the previous window. The summary will be in the form of a brief email or memorandum documenting the type of pile driving conducted, the number and type of piles driven or removed, and the results of monitoring, including the number of sightings of marine mammals (if any) and any actions taken.

Monitoring Protocol
A marine mammal monitoring coordinator (MC) will schedule monitoring activities in accordance with project activities. If no pile driving is scheduled, marine mammal monitoring will not occur. If pile-driving activities are planned, the MC will coordinate with the construction manager to determine if project activities are located in the North or South Zone, the methods of installation (vibratory and/or impact), and the plan for marine mammal monitoring areas.

Impact Monitoring
Marine mammal monitoring will be for impact pile-driving activities by a single qualified biologist. Marine mammal monitoring during the project will consist of the following procedures.

- Qualified biologists or other trained marine mammal observers who meet the list of qualifications for marine mammal observers will be present on site (on land or dock) at all times during impact pile-driving activities. One biologist is needed to cover all monitoring zones because the Level A zone is larger than the Level B zone.
- The MC will be located at the project area and will have direct access to the construction manager and pile driver. The MC will coordinate with observers through hand-held radios or cellular phones.
- The observer will be based on land or on the dock during all pile-driving activities. This individual will be stationed in the general vicinity of the pile being driven and will have clear line-of-sight views of the entire area within which temporary effects can be expected, up to 525 feet (160) meters for Level A harassment.

- In the event of a Beaufort sea state of 5 or above (17 to 22 knots wind speed), or if visibility is less than 1 mile, pile driving will cease and will not resume until conditions in the monitoring area reach acceptable levels.
- The observers will scan the waters within the monitoring areas using binoculars
- (10X42 or equivalent), spotting scopes (20-60 zoom or equivalent), and unaided visual observation.
- The waters will be scanned 20 minutes before pile driving or removal activities begin and during all pile-driving/removal activities. The observers will notify the on-site construction manager if any marine mammals enter or are observed within the monitoring area or 20 minutes prior to pile driving. That individual will be responsible for ensuring that work stops or does not begin until the animal has moved outside the monitoring area or until it has not been observed within the area for a period of 20 minutes.
- All observations of ESA-listed marine mammals will be documented in marine mammal observation forms.

Vibratory Monitoring

Marine mammal monitoring during vibratory driving will be similar to the methods outlined for impact driving, with the exception of the following changes for Level B monitoring areas. Level B monitoring areas will be established in the annual work plans depending on the location and size of piles proposed for vibratory driving (see Table 5).

One qualified biologist will be stationed in close proximity to monitor for marine mammals within the Level A area, 770 feet (235 meters), using the same protocol as described for impact monitoring.

Marine mammal monitoring will occur in collaboration with the Whale Museum for vibratory driving. The Whale Museum manages the largest database of daily whale sightings in Puget Sound. The MC will conduct daily online checks when any vibratory driving activity is planned to monitor the locations of southern resident orca using local, up-to-date sightings data in Port Gardner and North Puget Sound, from the south end of Whidbey Island north to all of Port Susan and the west side of Camano Island (Saratoga Passage). The MC will check the website (http://www.whalemuseum.org/hotlinefolder/update.html) and/or contact the museums biologist to obtain the latest location of whales. If it is determined that whales have been observed within the Level B monitoring area during the week preceding proposed work activities, the MC will contact NOAA Fisheries to determine appropriate monitoring protocols for the Level B area.

A log of the whales' locations will be maintained and submitted to NOAA Fisheries one week prior to vibratory pile-driving operations to ascertain the location and movements of the whales to determine monitoring requirements with NOAA Fisheries. If Southern Resident orca or humpback whale have been recently sighted in the Level B area, or are approaching these areas, the MC will coordinate directly with the Whale Museum in an effort to confirm whether whales are still in the area. If whales are still in the general area of the Level B area, the MC will;

- Consult with NOAA Fisheries to determine locations (vessel or land) to dispatch qualified field observers to monitor the appropriate Level B areas for marine mammals.
- Coordinate with observers to determine if the Level B area is clear of marine mammals before pile-driving operations begin.

- Notify the Port of Everett and the on-site supervisor (or the construction contractor) and provide a briefing of the location of the whales. The pile-driving contractor will be instructed to not initiate pile driving until the whales have moved outside of the Level B area. Field observers will verify that the Level B area is clear of ESA-listed marine mammals before pile driving will commence.

Minimum Qualifications for Marine Mammal Observers

- Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water′s surface with the ability to estimate target size and distance. Use of binoculars may be necessary to correctly identify the target.
- Experience and ability to conduct field observations and collect data according to assigned protocols. This qualification may include academic experience.
- Experience or training in identifying marine mammals in the field.
- Sufficient training, orientation, or experience with the construction operation for personal safety during observations.
- Writing skills sufficient to prepare a report of observations that includes such information as the number and types of marine mammals observed; their behavior in the project area during construction; the dates and times when observations were conducted; the dates and times when in-water construction activities were conducted; the dates and times when marine mammals were present at or within the defined temporary effect areas; and the dates and times when in-water construction activities were suspended to avoid incidental harassment by disturbance from construction noise, etc.
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the temporary effect areas.

REFERENCES

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