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

Refer to NMFS No.:
WCR-2016-4361

September 13 2016

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

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response [and Fish and Wildlife Coordination Act Recommendations] for the Regional General Permit 6 (RGP-6): Structures in Inland Marine Waters of Washington State

Dear Ms. Walker:

Thank you for your letter of March 23, 2016, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Regional General Permit 6 (RGP-6): Structures in Inland Marine Waters of Washington State.

The enclosed document contains a biological opinion (opinion) that analyzes the effects of your proposal to permit structures to be built in Puget Sound waters over a duration of 5 years. In this opinion, we conclude that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*), PS steelhead (*O. mykiss*), Hood Canal summer-run chum (*O. keta*), PS/Georgia Basin bocaccio *(Sebastes paucispinis)*, yelloweye rockfish *(S. ruberrimus*) , or canary rockfish *(S.pinniger)*; or SR killer whale *(Orcinus orca)*. Further, we conclude that the proposed action will not result in the destruction or adverse modification of their designated critical habitats.

As required by section 7 of the ESA, we are providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures we consider necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the COE and any person who performs the action must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes five conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the essential fish habitat conservation recommendation, the COE must explain why the recommendation will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendation. In response to increased oversight of overall essential fish habitat 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 essential fish habitat consultation and how many are adopted by the action agency. Therefore, we request that, in your statutory reply to the essential fish habitat portion of this consultation, you clearly identify the conservation recommendation accepted.

Please contact Stephanie Ehinger of my staff at the Oregon Washington Coastal Office at (360) 753-9530, or e-mail at stephanie.ehinger@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

Kim W. Kratz
for
Barry A. Thom.
Regional Administrator

Enclosure

cc:
Erin Legge, COE
Kristina Tong, COE
Gail Terzi, COE
Amy Leitman, Marine Surveys & Assessments
Logan Brown, Marine Floats
Leann Ebe McDonald, Shoreline Solutions LLC

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

Regional General Permit 6 (RGP-6): Structures in Inland Marine Waters of Washington State
Puget Sound

NMFS Consultation Number: WCR-2016-4361

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

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?*	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Puget Sound Steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No
Puget Sound fall Chinook (*O. tshawytscha*)	Threatened	Yes	No	No
Hood Canal Summer-run Chum (*O. keta*)	Threatened	Yes	No	No
Puget Sound/Georgia Basin Yelloweye Rockfish (*Sebastes ruberrimus*)	Threatened	Yes	No	No
Puget Sound/Georgia Basin Canary Rockfish (*S. pinniger*)	Threatened	Yes	No	No
Puget Sound/Georgia Basin Bocaccio (*S. paucispinis*)	Endangered	Yes	No	No
Southern Resident Killer whale (*Orcinus orca*)	Endangered	No*	NA	NA
Humpback Whale (*Megaptera novaeangliae*)	Endangered	Yes	No	NA

*Please refer to section 2.11 for the analysis of species or critical habitat that are not likely to be adversely affected.

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

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

Issued By:

Barry A Thom.
Regional Administrator

Date: September 13, 2016

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LIST OF ABBREVIATIONS AND ACRONYMS

ACZA	Ammoniacal Copper Zinc Arsenate
CFR	Code of Federal Regulations
CM	Conservation Measures
COE	United States Army Corps of Engineers
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FL	Fork Length
FR	Federal Register
HEA	Habitat Equivalency Analysis
HC	Hood Canal
HUC	Hydrologic Unit Code
ITS	Incidental Take Statement
MMMP	Marine Mammal Monitoring Plan
MPs	Mitigation Points
MPGs	Major Population Groups
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NLAA	May Affect, Not Likely to Adversely Affect
NOAA	National Oceanic and Atmospheric Administration
NWR	Northwest Region
OHWM	Ordinary High Water Mark
Opinion	Biological and Conference Opinion
OWS	Overwater Structures
PBF	Physical or Biological Features
PFMC	Pacific Fishery Management Council
PRFs	piers ramps and floats
PS	Puget Sound
RGP-6	Regional General Permit 6
RPM	Reasonable and Prudent Measures
SAV	Submerged Aquatic Vegetation
SEL	Sound Exposure Level
SPIF	Specific Project Information Form
SRKW	Southern Resident Killer Whales
T&Cs	Terms and Conditions
TSS	Total Suspended Solids
U.S.C.	United States Code
WDFW	Washington State Department of Fish and Wildlife

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 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 (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 Area Office.

1.2 Consultation History

NMFS completed the consultation on the first Regional General Permit 6 (RGP-6), Maintenance, Modification, and Construction of Residential Overwater Structures (OWS) in Inland Marine Waters within the State of Washington, on December 29, 2004. Regional General Permit 6 was in place for 5 years, from February 14, 2005 through February 14, 2010. This first programmatic consultation for these types of actions in Puget Sound (PS) was an informal consultation for which the proposed action reduced impacts of piers ramps and floats (PRFs) by setting improved standards for several design elements including grating, elevating piers, maximum dimensions, and avoiding submerged aquatic vegetation (SAV).

In 2007, the COE re-initiated consultation, partially in response to new ESA listings for PS. On June 11, 2007, NMFS concurred with all “may affect, not likely to adversely affect” determinations for listed and proposed species and critical habitat. On February 26, 2010, NMFS agreed to a request from the COE for a six month time extension of RGP-6, till October 14, 2010 on the basis that a six month time extension would not change the 2007 analysis and effect determinations.

Since the beginning of 2010, the COE and NMFS have been working jointly, in a pre-consultation setting, on updating RGP-6. The focus of the pre-consultation was twofold: maximizing avoidance and minimization of impacts, and at the same time looking for ways to reduce the large number of variances--projects that do not fit the design specifications of RGP-6.

To get input from the PRF builders on design options to minimize impacts, NMFS convened a meeting with the industry and the COE on February 22, 2010. We received valuable input on design questions such as how far metal piers could span sensitive intertidal areas without being prohibitively expensive or structurally unsound (45 feet) on different float stop designs, and were able to encourage the development of techniques to prevent boat grounding. We also heard loud and clear from industry that new regulation and standards can be incorporated as long as they are predictable.

While consulting individually on PRF projects, after the 2005 RGP-6 had expired in October 2010, it became clear to NMFS that the impacts of many PRF were likely to adversely affect Chinook salmon and Chinook critical habitat. One of the first Opinions NMFS issued on a residential PRF was 2011/02213 on September 4, 2012, others followed. To minimize habitat impacts, NMFS and the COE started to routinely request habitat mitigation during PRF consultations, often using Habitat Equivalency Analysis (HEA) to estimate impacts and benefits from mitigation proposals.

Neither the COEs' nor NMFS' databases allowed for determining the exact number of new or replacement PRF projects that were consulted on over the life of the 2005 RGP-6. However, NMFS reviewed hard copies of consultation records which showed that the numbers of PRFs was high; both for PRFs that met the conditions of RGP-6 and PRFs that exceeded the conservation measures (CMs) of RGP-6. In 2008, NMFS records show that about 42 new PRF projects were consulted on for PS. Because of the substantial number of new PRFs, NMFS and the COE felt that a reliable baseline, build-out scenario, and cumulative effects analysis were needed to establish an analysis threshold for habitat effects related to PRFs. As the COE indicated that they did not have any resources to provide either baseline, buildout, or cumulative effects analysis, NMFS engaged in the effort for the COE (Memo by Stephanie Ehinger about phone call with Marcy Reed 4-15-2011), and NMFS began a buildout GIS analysis with the help of NMFS GIS specialists in the fall of 2010. Toward the end of 2011, it became clear that the project was too complex, including obtaining and merging GIS maps from many different jurisdictions, for NMFS to complete with available GIS resources. In response, NMFS and the COE decided to pursue a different approach with the COE proposing mitigation as a required part of RGP-6 to offset habitat impacts from PRFs. The concept that the COE and NMFS jointly developed for this consultation was that with full mitigation for habitat effects and an upper ceiling for new projects covered under RGP-6, NMFS could avoid, for life of the permit, establishing an effects threshold with the understanding that there would be little to no net loss of overall critical habitat function. While COE staff and NMFS agreed on this approach, the details of the mitigation still had to be developed.

On April 24, 2012, NMFS received a BE and request for informal consultation from the COE. In our non- concurrence letter from June 21, 2012, we initiated consultation while pointing out areas of the proposed action that needed to be further addressed (minimization of impacts, mitigation, and refining the proposed action to avoid the issue of frequent variances) during consultation. However, responses from the COE on the missing information were slower than needed for NMFS to complete the consultation within the statutory timeframe. Thus, NMFS sent a letter on August 2, 2012, informing the COE that we would initiate consultation as soon as the proposed action had been finalized.

To address the remaining issues, NMFS set up a meeting, drafted an agenda, and met with the COE at their offices on July 24, 2012. NMFS proposed using the HEA to quantify habitat impacts and develop a draft model that allowed for the calculation of habitat values in the nearshore. The approach of the development of habitat impact and mitigation tables that the COE would include in their proposed action was consistent with a joint NMFS and COE effort for RGP 5 in the Upper Columbia River that also proposed using HEA for habitat impact and benefit calculations. NMFS provided the COE with literature about HEA and in 2012/2013 gave several presentations on HEA use in the PS nearshore to stakeholders and COE staff (January 27, 2013). In 2013, the main COE staff contact started drafting a mitigation table based on HEA, similar to one proposed by the COE in RGP 5, (e-mail from Marcy Reed to Stephanie Ehinger, June 20, 2013).

In July 2013, the COE transferred the lead staff responsibility for the consultation. Some time elapsed for the new COE staff to review the consultation background, to understand the use of HEA, and to identify potentially new directions they wanted to consider for the issuance of the permit. In an August 12, 2013 meeting in Lacey we re-visited and refined the concept of the proposed action. The issues we worked on in this August 12 meeting included pending issues NMFS had assembled in April 2012 and were awaiting resolution. These issues included annual inspections, addition of boat lifts, and the practicality of some of the CMs that the COE was proposing (Meeting Notes from May 9 phone conference, 2013).

Between August 2013 and September, 2015 (when the public notice for the proposed action was published) NMFS and the COE worked mainly on identifying the final elements to include in the proposed action. Elements discussed included: (1) addition of a new action category: construction of stairs to facilitate beach access, (2) maintenance actions, (3) COE monitoring of project implementation and mitigation, (4) exclusion of mitigation for indirect effects from boats, (5) simplifying the impact and mitigation tables for RGP-6 which are based on HEA, (6) revising the duration for which habitat impacts are determined (from in perpetuity to 40 years), and (7) implementation of CMs. Major delays occurred after an April 30, 2014 meeting, again in Seattle. Through these discussions the COE sought more detail for elements of the mitigation and impact tables (water quality), and simplification in other areas (e.g., submerged aquatic vegetation scenarios).

The COE submitted an electronic request for consultation containing a final proposed action (including the mitigation and impact calculation table developed by NMFS for the COE) to NMFS on March 18, 2016. While the proposed action included substantial improvements over the previous RGP-6 consultation, chiefly the proposed mitigation, several of the issues both agencies worked on over the last years were ultimately not included, and an outline on how the COE would process applications that did not meet the design criteria (specific project information form (SPIF) variances). However, NMFS accepted the SPIF, basically a proposed action, as a complete request for consultation and uses March 18, 2016 as the consultation initiation date.

The U.S. Army Corps of Engineers has determined that the proposed RGP-6 would have the following effects on listed species under NMFS management authority:

Puget Sound (PS) Chinook: may affect, likely to adversely affect
PS Chinook critical habitat: may affect, likely to adversely affect
PS steelhead: may affect, not likely to adversely affect
Hood Canal summer chum: may affect, likely to adversely affect
Hood Canal summer chum critical habitat: may affect, likely to adversely affect
Georgia Basin (GB) bocaccio: may affect, likely to adversely affect
GB bocaccio critical habitat: may affect, likely to adversely affect
GB canary rockfish: may affect, likely to adversely affect
GB canary rockfish critical habitat: may affect, likely to adversely affect
GB yelloweye rockfish: may affect, likely to adversely affect
GB yelloweye rockfish critical habitat: may affect, not likely to adversely affect
Southern resident (SR) killer whale: may affect, not likely to adversely affect
Humpback whale: may affect, not likely to adversely affect

We disagree with the COEs effect determination for PS steelhead and included or analysis of the effects of the proposed action on this species in the effect analysis of our opinion.

The following is a programmatic biological opinion available to the Corps and anyone wanting to use RGP 6 to obtain a permit to build an overwater structure in PS and Hood Canal. If a person wishes to obtain a permit for a structure that does not meet the criteria of RGP 6 outlined in this opinion, they can apply for an individual permit. This permit will require an individual ESA section 7 consultation. Since no individual is required to use this programmatic opinion, there is no specific applicant recognized for the purposes of this consultation.

1.3 Proposed 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 proposes to implement its RGP-6 program in PS, WA through its authorities under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Regional General Permit 6 is applicable to inland marine waters of the state of Washington with the exception of Elliott Bay in Seattle. Elliott Bay extends from the tip of West Point in Discovery Park south to the tip of Alki Point in West Seattle. Further, RGP-6 does not apply to sites in or within 300 feet of an existing or previously designated Superfund site (http://www.epa.gov/superfund) or Washington State Model Toxic Control Act site (https://fortress.wa.gov/ecy/publications/publications/ftc94129.pdf) cleanup site.

Work proposed to be authorized by the COE under RGP-6 includes the installation of new residential OWS and associated elements in inland marine waters of Washington State for the purpose of private watercraft moorage and water-oriented recreational use. These structures include piers, ramps, and floats (PRF); mooring buoys; marine rails; watercraft lifts; open-frame stairways, and bluff-to-beach trams which are further described in Appendix A of the SPIF, see Appendix 1.

The COE proposes to issue RGP-6 for 5 years. Over these 5 years, the COE proposes to permit a maximum of 150 PRFs with 30 projects per year, and a maximum of five structures a year each of marine rails, trams, and stairs. The COE further proposes compensatory mitigation to offset habitat impacts resulting from the existence of the structures. To ensure compliance with their terms and conditions (T&Cs[1]) the COE proposes to inspect an unspecified percentage of all structures and compensatory mitigation annually.

The COE's SPIF includes T&Cs intended to avoid and minimize impacts. These T&Cs include limits on the size and number of structures, limits on the number and size of pilings, minimum amounts of grating, restrictions on the use of treated wood, minimization of vegetation removal, and work windows:

- The maximum float size for a single use PRF will be 8 feet by 30 feet (240 sq ft)
- supported by 4 pilings.
- The maximum float size for a joint use PRF will be 8 feet by 60 feet (480 sq ft) supported by 8 pilings.
- Piers and stairs must be fully grated.
- Pier support pilings must be spaced a minimum distance of 20 feet apart. An average length pier of 100 feet would result in a maximum of 12 pilings to support the pier. Usually pilings are spaced further apart.
- With an additional 2 moorage pilings, 2 pilings for a watercraft lift, and 4 pilings for the float, the average maximum total number of pilings for a single use PRF will be 20 (most piers are shorter than 160 feet, span further than 20 feet and use around 12 pilings).
- Steel pilings to be installed with an impact hammer will not exceed 12 inches in diameter. Impact pile strikes will not exceed 300 in a day.
- Floats must have a minimum of 50 percent grating and all grating must have a minimum of 60 percent open space.
- The only treated wood that will be used is wood treated with ammoniacal copper zinc arsenate (ACZA) that is treated following the "Best Management Practices for the Use of Treated Wood in Aquatic and Wetland Environments" and certified by an independent third party inspection agency to have been produced in compliance with the BMPs. Further no treated pilings will be used in forage fish spawning habitat or on State-owned aquatic lands. The use of ACZA-treated wood in over-water use is not restricted.
- In-water work will be conducted during the applicable in-water work window as listed on the COE website (Marine Water Work Windows, http://www.nws.usace.army.mil/Missions/CivilWorks/Regulatory/PermitGuidebook.aspx). In water work windows for salmonids in PS vary by tidal reference area. The earliest start time is July 2 and the latest end time is March 2. Work windows in Hood Canal are proposed for July 16 to March 1. Presence of forage fish spawning usually shortens these work windows.

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[1] The proposed action includes conservation measures that the COE terms T&Cs. These "proposed T&Cs" are part of the proposed action and are different from the T&Cs that we provide later in the ITS of this document.

- If Southern Resident Killer whales (SRKW) have been documented more than four times during the proposed work window in the quadrant[2] the project area is located in, a Marine Mammal Monitoring Plan (MMMP) must be prepared and submitted. The MMMP may be reviewed by a NMFS biologist. The goal of a MMMP is to stop or not start work if a marine mammal is in the area where it may be affected by pile driving noise.
- If in one or both of the previous two years there were four or more humpback whale sightings during the proposed work month, in the basin where pile driving will occur, a MMMP must be submitted.
- Disturbance of riparian vegetation is discouraged. In particular, vegetation on the face of the bluff should not be removed, trimmed, or altered. If there is no alternative but to impact vegetation on the face of the bluff, it should be done so in accordance with a slope stability plan/report. If vegetation is cleared, mitigation will be determined on a case-by-case basis based on the type and amount of vegetation removed or altered.

RPG-6 includes a limit on the size of the structures. The COE relayed to us (e-mail from 9-9-2016) that they also will submit larger structures under RGP-6. Therefore, our analysis focuses on the total overwater coverage expect to result from the proposed action rather than the size of an individual structure. We assume, based on the proposed float coverage, that over the 5 years of the permit, the maximum combined (cumulative) size of all new floats authorized under this permit will not exceed 36,000 sqft = 150*240 sqft (0.8 acres)--regardless of individual float sizes. In addition, based on this aerial coverage and the proposed design criteria, no more than 3,000 pilings will be driven to support the PRFs (i.e., 150 PRFs * 20 pilings/PRF). Thus, if the COE chooses to permit individual floats that are larger than 240 sq ft under RGP-6, the number of PRF's that can be permitted till the maximum amount of overwater coverage (OWC) considered in this consultation is reached will be proportionally smaller than 150 PRFs.

Trams usually consist of cables and two helical screw anchors at the bottom of the slope in the upper intertidal zone. Stairs usually involve installation of up to six pilings at the bottom of slopes or bluffs. Footings for stairs and tram cables are limited to one cubic yard per anchor.

The COE proposes to require mitigation for direct habitat impacts to PS Chinook and Hood Canal summer-run chum salmon critical habitat for all applicants using RGP-6. Mitigation for project-related direct effects is a requirement for participation in the program. Required mitigation will be proportional to structure size and amount of grating. The COE does not propose mitigation for indirect effects of PRFs, such as the effects of boats using the PRFs for moorage. Mitigation options include measures that can be implemented on-site, including riparian plantings, placement of spawning gravel, installation of large woody material, removal of pilings, removal of existing OWC, removal of hardened bank stabilization, removal of boat ramp, and removal of rails. Proposed on-site mitigation includes all minimization measures developed for the installation of new structures, including work windows. In addition, on-site mitigation in the intertidal is proposed to take place in the dry, at low tide and outside of forage fish spawning times. Proposed off-site mitigation includes removal of manmade groins as well as purchasing credits from third party mitigation, Appendix I Table 3. While the benefits of off-site mitigation can be used to offset habitat impacts resulting from the actions proposed under RGP-

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[2] NOAA's website identifies these quadrants
http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/evaluating_sound.html

6, negative effects of off-site mitigation are not analyzed or included in this consultation. Off-site mitigation implemented by third parties is usually permitted under separate programmatics specific for restoration, the 4d Limit 8 rule, or for large and higher risk restoration via an individual consultation. The quantification of impacts resulting from the 40-year existence of the proposed structures and required mitigation is based on Habitat Equivalency Analysis (HEA) in conjunction with the NHV model (Ehinger et al. 2015), Appendix B Table 2 & 3 in Appendix I: SPIF.

Assumptions in the NHV and HEA model for PS include:

- Effects to habitat result from removal or degradation of riparian vegetation.
- Effects to intertidal habitat result from shading.
- Habitat effects from OWS occur in the area directly underneath the structure plus a buffer area, generally 10-feet wide, where partial shading occurs.
- The proposed structures will be in place for 40 years. This is the average lifespan of a PRF. After 40 years likely maintenance, repair, and replacements of the proposed structures in not included in this consultation.

The HEA method assesses both ecological services lost or gained by taking into consideration: (1) the relative values of the subject habitat before and after a project is implemented, (2) the size of the area affected where the damage (or habitat improvement) has occurred, (3) the time it takes for altered habitats to reach fully functioning condition, (4) the duration for which the altered habitat is expected to remain in place (e.g., how long a pier will remain in place, or a restored habitat is expected to exist), and (5) a discounting factor. HEA estimates the total net loss or gain of ecosystem service to an affected area with these five input parameters. The discounting factor, as in economics, is used to account for the difference between when the loss in ecosystem service occurs and when the restored habitat becomes fully functional (NOAA 1999, Ray 2008).

The functional loss or gain of the ecosystem service(s) assessed with HEA is expressed in a dimensionless unit, a common habitat currency which for this consultation was termed Mitigation Points (MP). The debt is the functional loss in ecosystem services that are essentially withdrawn, or made inaccessible from the impacted habitat. The number of MPs lost from the impact indicates how much restoration of the damaged site and will be needed to offset the lost habitat functions.

The underlying concept of using a common currency to express functional habitat loss and gain is known as *ecological equivalency*. Ecological equivalency is a service-to-service approach that assumes that the ecological functions and services for a species or group of species that are gained from habitat at a restored site fully offset the functions and services lost at an impacted site, when discounting and time to full function at the restored site are incorporated into the analysis. Applying HEA requires balancing reductions in habitat quality against gains from restoration actions without losing limiting habitat functions (Cacela et al., 2005). Strange et al. (2002) explain, that the underlying assumption of HEA is that the public will accept a one-to-one trade-off between a unit of lost habitat services and a unit of restoration project services. Thus, there is not necessarily a one-to-one trade-off in terms of specific resources but rather in the services they provide for the species adversely impacted. In that sense, the reduction in productivity resulting from shading of intertidal habitat can be offset with the productivity (allochtonous input) provided by riparian plantings.

“Indirect effects” are those effects that are cause by or will result from the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02).).
The presence of boats and the use of boats are indirect effects of the action, as we are reasonably certain that new PRFs, marine rails, boat lifts, and mooring buoys each will increase the abundance and use of boats in PS. The express purpose of marine rails, boat lifts and mooring buoys is to store boats in the PS nearshore and/or provide boat access to the water. Thus, but for these structures, boat use of PS waters would be much more difficult, restricted to marinas or public access point and a large percentage of shoreline residents would likely not access the water with boats or access the water at reduced frequency.

As for PRF, we are reasonably certain that most of them serve the purpose to moor a boat and provide easy access to boating. We base this on an areal analysis of PRF in Wollochet Bay, Appendix II. Of 37 PRFs we counted along the east side of Wollochet Bay in areal pictures from 7/5/2012, 25 PRFs had boats moored next to the structure. Two thirds of the PRFs had boats moored not even counting boats that are associated with a PRF via a boat lift or mooring buoy. We counted 17 floating boat lifts and 24 boats (that were likely moored at buoys which were not visible at the available resolution) of which some were likely associated with PRFs. If a float is in a location where it can ground out, a small boat is often used to access the boot moored at a mooring buoy or floating boat lift located in slightly deeper water. Thus, it is reasonable to assume that at least some of the 12 PRF that did not have a boat moored next to them still are associated with a boat. In summary, this strong association between boats and PRF, mooring buoys, and boat lifts suggests that, but for these proposed structures, boat presence and use in PS would be less. Thus, boat presence and use is an indirect effect of the proposed action.

1.4 Action Area

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

The action area includes all riparian areas, shoreline, and all waters, shallow as well as deep waters of PS. Although most of the effects of the action will occur in the vicinity of each structure (PRF, marine rail, staircase, watercraft lift, or buoy), impact pile driving, reductions in forage, increases in predator populations, and effects from boating activity have the potential to affect listed salmonids and steelhead throughout PS.

Puget Sound is occupied by PS Chinook salmon, PS steelhead, HCSR chum salmon, three species of listed rockfish, and SRKW. Portions of the action area are designated as critical habitat for these species. Puget Sound is also EFH for Chinook, coho and pink salmon, as well as groundfish[3].

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[3] http://www.westcoast.fisheries.noaa.gov/habitat/fish_habitat/efh_consultations_go.html

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, Federal agencies must ensure that their 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 habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

The proposed action is not likely to adversely affect Southern Resident Killer Whales or their critical habitat. The analysis is found in the "Not Likely to Adversely Affect" Determinations section 2.11.

2.1 Analytical Approach

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

This biological opinion 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 7414).

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 likely 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 to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.

- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be 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 physical and biological features 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 of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. Climate change is expected to make recovery targets for these species more difficult to achieve.

During the last century, average regional air temperatures increased by an average of 1.3°F. Warming is likely to continue and annual average air temperatures are predicted to increase 3°F to 10°F by 2070 to 2099 compared to 1970 to 1999. Temperature increases are expected to be largest in the summer (Melillo et al., 2014). Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Karl et al., 2009). And in the interior western U.S., suitable habitat for salmon and steelhead is projected to decline an average of 47 percent by 2080 compared to 1978-1997 (Melillo et al., 2014).

Forecasts for precipitation trends during the next century are less certain than for air temperature and vary depending on model assumptions and season. However, assuming continued growth in global heat-trapping gas emissions, summer precipitation in the Pacific Northwest is projected to decrease by an average of 10 percent during the remainder of this century (Melillo et al., 2014). Where snow occurs, a warmer climate will cause earlier snowmelt, resulting in increased late winter/early spring stream flows and reduced summer/fall flows (ISAB, 2007; Karl et al., 2009; Melillo et al., 2014).

Global warming projections show the highest risk for flooding in basins where rivers derive their water from both winter rainfall and spring snowmelt runoff (Melillo et al., 2014). Higher winter stream flows increase the risk that winter floods will damage spawning redds and wash away incubating eggs. Earlier peak stream flows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation. Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (Karl et al., 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB, 2007).

The earth's oceans are also warming, with considerable interannual and interdecadal variability superimposed on the longer-term trend (Bindoff 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 (Scheuerell and Williams, 2005; Zabel et al., 2006; Karl et al., 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel et al., 2006).

In addition to the changes noted above, ocean acidification resulting from the uptake of carbon dioxide by ocean waters threatens corals, shellfish, and phytoplankton (e.g. foraminifera and coccolithophores) that form their shells and skeletons from calcium carbonate (Orr et al., 2005); (Feely et al., 2012). Such ocean acidification is essentially irreversible over a time scale of centuries (Royal Society, 2005). Increasing carbon dioxide concentrations are reducing ocean pH and dissolved carbonate ion concentrations, and thus calcium carbonate saturation. Over the past several centuries, ocean pH has decreased by about 0.1 pH units (an approximately 30 percent increase in acidity), and is projected to decline by another 0.3 to 0.4 pH units (approximately 100 to 150 percent increase in acidity) by the end of this century (Orr et al. 2005; Feely et al. 2012). As aqueous carbon dioxide concentrations increase, carbonate ion concentrations decrease, making it more difficult for marine calcifying organisms to form biogenic calcium carbonate needed for shell and skeleton formation. The reduction in pH also affects photosynthesis, growth, and reproduction. Further, the upwelling of deeper ocean water, deficient in carbonate, and thus potentially detrimental to the food chains supporting juvenile salmon has recently been observed along the U.S. west coast (Feely et al. 2008).

Acidification in Washington State coastal and estuarine waters is compounded by a combination of factors (Feely et al. 2012). Upwelling of carbon dioxide-rich offshore waters with naturally low pH from respiration processes exacerbates the effects of anthropogenic carbon dioxide. Inputs of nutrients such as nitrogen, silicate, and phosphorus from upwelling and surface runoff stimulate the growth of marine algae, temporarily decreasing carbon dioxide and increasing pH. As these blooms die and decompose, carbon dioxide is released and pH is driven down in deeper waters. Similarly, carbon dioxide is released via bacterial respiration from decaying organic matter delivered to coastal and estuarine waters from freshwater rivers and streams. All of these forces converge and interact at the coasts and estuaries, making these areas particularly sensitive to the impacts of climate change.

Finally, especially relevant to this consultation, sea level rise is a reality of climate change. Global sea level has risen about 7 inches during the 20th century and is projected to rise at a higher rate in the future. In the PS region sea level rise is expected to be moderated by tectonic uprising and range between about 3/5 and 11/5 inches per decade (Committee on Sea Level Rise in California et al., 2012). Sea level rise is putting pressures on coastal regions to protect against flooding.

2.2.1 Status of the Species

For Pacific salmon, steelhead, and certain other species, we commonly use the four "viable salmonid population" (VSP) criteria (McElhany et al. 2000) to assess the viability of the populations that, together, constitute the species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits (McElhany et al. 2000).

"Abundance" generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle (i.e., the number of naturally-spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany et al. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of the long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany, 2000).

Abundance

Puget Sound Chinook salmon. Abundance across the PS Chinook ESU has generally decreased between 2010 and 2014, with only 6 of 22 populations (Cascade, Cedar, Mid-Hood Canal, Nisqually, Suiattle and Upper Sauk) showing a positive change in the 5-year geometric mean natural-origin spawner abundances (recent 5-year status review). However, all 6 of these populations have relatively low natural spawning abundances of < 1,000 fish, so these increases represent small changes in total ESU abundance. Fifteen-year trends in log wild spawner abundance (1990-2005 and 1999-2014) for each PS Chinook population were negative in the latter period for 17 of the 22 populations but for only 2 of the 22 populations (Elwha and Puyallup) in the earlier period. Thus, there is a stronger decline in wild spawner abundance across all major population groups (MPGs) in the recent 15 years compared to the previous 15 years (NWFSC, 2015). Combined spawner abundance for the ESU ranges around 40,000 Chinook[4] (NOAA Salmon Population Summary SPS Database, Northwest Fisheries Science Center).

Rockfish. There are no estimates of historic or present-day abundance of yelloweye rockfish, canary rockfish, or bocaccio across the full DPSs area. In 2013, the WDFW published abundance estimates from a remotely operated vehicle survey conducted in 2008 in the San Juan Island area (Pacunski et al. 2013). This survey was conducted exclusively within rocky habitats and represents the best available abundance estimates to date for one basin of the DPS. The survey produced estimates of 47,407 (25 percent variance) yelloweye rockfish, 1,697 (100 percent variance) canary rockfish, and 4,606 (100 percent variance) bocaccio in the San Juan area (Tonnes et al., 2016).

Further, data suggest that total rockfish declined at a rate of 3.1 to 3.8 percent per year from 1977 to 2014 or a 69 to 76 percent total decline over that period. The three listed species declined over-proportional compared to the total rockfish assemblage. Therefore, long-term population growth rate for the listed species was likely even lower (more negative) than that for total rockfish. Finally, there is little to no evidence of recent recovery of total rockfish abundance to recent protective measures.

Puget Sound Steelhead. No abundance estimates exist for most of the summer-run populations; all appear to be small, most averaging less than 200 spawners annually. Summer-run populations are concentrated in northern PS and Hood Canal; only the Elwha River and Canyon Creek support summer-run steelhead in the rest of the DPS. Steelhead are most abundant in northern PS, with winter-run steelhead in the Skagit and Snohomish rivers supporting the two largest populations (approximately 3,000 and 5,000 respectively). From 2005-2009, geometric means of natural spawners indicate relatively low abundance (4 of 15 populations with fewer than 500 spawners annually) and declining trends (6 of 16 populations) in natural escapement of winter-run steelhead throughout PS, particularly in southern PS and on the Olympic Peninsula (Ford et al. 2011).

Hood Canal Summer-Run Chum. The Hood Canal summer chum ESU is comprised of two independent populations; one that includes the spawning aggregations from rivers and creeks draining into the Strait of Juan de Fuca and one that includes spawning aggregations within Hood Canal. Of 18 historically present spawning aggregations among the two populations 14 are extant. Some of the 14 extant aggregations are the result of reintroduction programs.

In both populations, spawning abundance was relatively high in the 1970s, lowest during 1985−1999, and higher again for the most recent 10 years. The overall trend in spawning abundance was generally stable (close to one) for the Hood Canal population (for all spawners

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[4] Combined Chinook spawner Abundance for 2013 is 38,960.

and for natural-origin spawners) and for the Strait of Juan de Fuca population (all spawners). Strait of Juan de Fuca natural-origin spawners have a significant positive trend (Ford et al. 2011).

Productivity

Puget Sound Chinook salmon. Chinook salmon productivity in the PS ESU across the time period 1980-2015 has been variable. Across the PS ESU, 8 of 22 PS Chinook populations show natural productivity below replacement in all years since the mid-1980's. However in many cases total spawning abundance was maintained through hatchery supplementation. The White River population in the Central/South Puget Sound MPG was above replacement from the mid 1980's to early 2000's, but has dropped in productivity consistently since the late 1980's. In recent years, only 8 populations have shown productivities above zero. These are Cascade, Lower Sauk, Lower Skagit, Suiattle, Upper Sauk, Upper Skagit in the Whidby Basin MPG, and Mid-Hood Canal and Cedar River in the Hood Canal and Central/South Puget Sound MPG's, respectively.

Rockfish. Mature females of each listed species produce from several thousand to over a million eggs annually (Love et al., 2002). In rockfish the number of embryos produced by the female increases with size. For example, female copper rockfish that are 20 cm in length produce 5,000 eggs while a female 50 cm in length may produce 700,000 eggs (Palsson, 2009). These specific observations come from other rockfish, not the three listed species. However, the generality of maternal effects in Sebastes suggests that some level of age or size influence on reproduction is likely for all species.

Puget Sound Steelhead. Since 1992 there has been a general downward trend in steelhead populations in this DPS. Busby et al. (1996) reviewed the 21 populations in the PS DPS and found that 17 had declining trends and four had increasing trends. Marked declines in natural run size are evident in all areas of the DPS. Even sharper declines are observed in southern PS and in Hood Canal. Throughout the DPS, natural steelhead production has shown a weak response to reduced harvest since the mid-1990s. Median population growth rates were estimated for several populations in the DPS, using the 4-year running sums method (Holmes 2001; Holmes and Fagan 2002). They estimated that the growth rate was less than 1 for most populations in the DPS, meaning the populations are declining.

Hood Canal Summer-Run Chum. Productivity in the last 5-year period has been low compared to the period from 1992 to 2001. Recruits per spawner for the ESU was around 9.5 between 1992 and 2001 and sank to 1.49 between 2002 and 2006.

Spatial Structure and Diversity

Puget Sound Chinook salmon. One indicator of spatial structure and diversity is the proportion of natural-origin spawners; another is the distribution of a population across different life history strategies. Generally, populations with high natural-origin spawner contributions show higher spatial structure and diversity than populations with high hatchery-origin spawner contributions. For PS Chinook salmon, there is a declining trend in the proportion of natural-origin spawners across the ESU during the entire time period 1990-2014.

Individual members of stream and ocean-type Skagit River Chinook salmon exhibit a variety of alternative spatial and temporal life history strategies in their use of available habitat (Beamer, 2005). Four different alternative life history strategies based upon the size at estuarine entry and estuarine arrival time can be defined: fry migrants, delta migrants, parr migrants, and yearlings. Residence time in the Skagit River estuary was found to decrease as the size of the fish entering the estuary increased (Beamer, 2005). Fry migrants reared for only a short period in delta habitat and migrated into deeper water (Skagit Bay) early in the year, usually February and March at an average fork length of 39 millimeters. Some fry migrants take up residence in pocket estuaries (Beamer et al., 2003). Especially for these small fish, unobstructed nearshore passage to pocket estuaries is important for survival. In Skagit bay the growth rate is size dependent, larger juveniles exhibiting higher growth rates. Juveniles that reside the shortest in the Skagit delta, the fry migrants, show the smallest growth rate of all life history stages in Skagit bay. Furthermore, Beamer et al. (2004) find it likely that fry migrants survive poorly once they reach Skagit Bay. One reason for the poor bay survival of fry migrants is that the small size upon entry into the bay makes them susceptible to predation by predators like the ubiquitous staghorn sculpin (Beamer, 2007).

Even though these different life history forms have to date been studied most extensively in Skagit River Chinook salmon, Beamer et al. (2005) assume that they naturally occur in other populations, too. Further, Beamer et al. (2005) assume that the distribution within a population will depend upon environmental conditions. For example, the large number of fry migrants in the Skagit can be interpreted as a response to limited delta habitat.

In general, delta rearing Chinook salmon rear in the natal river delta one to two months before moving out into the bay. In the Skagit River, they reach an average size of 74 millimeter fork lengths at bay entry in May and June (Beamer et al., 2005). Parr migrants rear for a couple of months in freshwater to achieve a similar size as their tidal delta rearing cohorts over the same time period. Parr migrants do not reside in tidal delta habitats. They mainly migrate through the delta to adjacent nearshore areas. Yearlings rear in freshwater for over a year. Then they migrate quickly through the estuary and shallow subtidal areas. They quickly take up residence in deeper subtidal or offshore areas. A variable and small percentage of PS ocean type Chinook expresses the yearling life history type. For all but the small percentage of yearling life history type, the shallow marine nearshore habitat is important for early marine rearing.

Puget Sound Steelhead. PS steelhead are found in all accessible large tributaries to PS and the eastern Strait of Juan de Fuca (WDFG 1932). Nehlsen et al. (1991) identified nine PS steelhead stocks at some degree of risk or concern.

The WDF et al. (1993) identified 53 stocks within the DPS, of which 31 were considered to be of native origin and predominantly natural production. Of the 31 stocks, they rated 11 as healthy, three as depressed, one as critical, and 16 as unknown.

There are two types of steelhead, winter steelhead and summer steelhead. Winter steelhead become sexually mature during their ocean phase and spawn soon after arriving at their spawning grounds. Adult summer steelhead enter their natal streams and spend several months holding and maturing in freshwater before spawning. The PS steelhead DPS is composed primarily of winter-run populations.

(1) Steelhead habitat has been dramatically affected by a number of large dams in the PS Basin that eliminated access to habitat or degraded habitat by changing river hydrology, temperature profiles, downstream gravel recruitment, and movement of large woody debris.

(2) In the lower reaches of rivers and their tributaries, urban development has converted natural areas (e.g. forests, wetlands, and riparian habitat) into impervious surfaces (buildings, roads, parking lots, etc.). This has changed the hydrology of urban streams causing increases in flood frequency, peak flow, and stormwater pollutants. The hydrologic changes have resulted in gravel scour, bank erosion, sediment deposition during storm events, and reduced summer flows (Moscrip and Montgomery 1997; Booth et al. 2002; May et al. 2003).

(3) Agricultural development has reduced river braiding, sinuosity, and side channels through the construction of dikes and the hardening of banks with rip-rap. Constriction of rivers, especially during high flow events, increases gravel scour and the dislocation of rearing juveniles. Much of the habitat that existed before European immigration has been lost due to these land use changes (Beechie et al. 2001; Collins and Montgomery 2002; Pess et al. 2002).

(4) In the mid-1990s, WDFW banned commercial harvest of wild steelhead. Previous harvest management practices contributed to the decline of PS steelhead (Busby et al. 1996). Predation by marine mammals (principally seals and sea lions) and birds may be of concern in some local areas experiencing dwindling steelhead run sizes (Kerwin 2001).

(5) Ocean and climate conditions can have profound impacts on steelhead populations. Changing weather patterns affect their natal streams. As snow pack decreases, in-stream flow is expected to decline during summer and early fall (Battin et al. 2007).

(6) The extensive propagation of the Chambers Creek winter steelhead and the Skamania Hatchery summer steelhead stocks have contributed to the observed decline in abundance of native PS steelhead populations (Hard et al. 2007). Approximately 95 percent of the hatchery production in the PS DPS originates from these two stocks. The Chambers Creek stock has undergone extensive breeding to provide an earlier and more uniform spawn timing. This has resulted in a large degree of reproductive divergence between hatchery and wild winter-run fish. The Skamania Hatchery stock is derived from summer steelhead in the Washougal and Klickitat rivers and is genetically distinct from the PS populations of steelhead. For these reasons, Hard et al. (2007) concluded that all hatchery summer- and winter-run steelhead populations in PS derived from the Chambers Creek and Skamania Hatchery stocks should be excluded from the DPS. NMFS included two hatchery populations that were derived from native steelhead, the Green River winter-run and the Hamma Hamma winter-run, as part of the DPS (72 FR 26722).

Hood Canal Summer-Run Chum. Diversity was low in the 1990, like abundance. Since 2000 diversity seems to have increased which is likely due to the three reintroduced spawning aggregations (Ford et al. 2011).

Summary

In addition to the information on VSP parameters most relevant to this consultation, Table 1, provides a summary of listing and recovery plan information, status summaries and listing 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 at NMFS's West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

Table 1.

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. No trend was notable for total ESU escapements; escapement trends vary from decreasing to increasing among populations. Median recruits per spawner for the last 5-year period (brood years 2002-2006) is the lowest over any of the 5-year intervals. Many of the habitat and hatchery actions identified in the Puget Sound Chinook salmon recovery plan are likely to take years or decades to be implemented and to produce significant improvements in natural population attributes, and these trends are consistent with these expectations.	• 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
Hood Canal summer-run chum	Threatened 6/28/05	Hood Canal Coordinating Council 2005 NMFS 2007	NWFSC 2015	This ESU is made up of two independent populations in one major population group. The spawning abundance of this ESU has clearly increased since the time of listing, although the recent abundance is down from the previous 5 years. However, productivity in the last 5-year period (2002-2006) has been very low, especially compared to the relatively high productivity in the 5-10 previous years. Since abundance is increasing and productivity is decreasing, improvements in habitat and ecosystem function likely are needed.	• Reduced floodplain connectivity and function • Poor riparian condition • Loss of channel complexity Sediment accumulation • Altered flows and water quality
Puget Sound steelhead	Threatened 1/5/06	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. Most populations within the DPS continue downward trends in estimated abundance, a	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
				few sharply so. Only three winter-run steelhead populations examined exhibit positive growth rate. Trends could not be calculated for the South Puget Sound Tributaries winter-run population. Little or no data is available on summer-run populations to evaluate extinction risk or abundance trends.	• 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
Puget Sound/ Georgia Basin DPS of canary rockfish	Threatened 04/28/10	In development	Drake et al. 2010	Historically, the South Sound may have been a population stronghold within the DPS, but it appears to be greatly depleted. Past commercial and recreational fishing may have depressed the DPS to a threshold beyond which optimal productivity is unattainable. The apparent steep reduction of fish in Puget Sound proper leads to concerns about the viability of these populations. The ability of adults to migrate hundreds of kilometers could allow the DPS to re-establish spatial structure and connectivity in the future under favorable conditions	• Over harvest • Water pollution • Climate-induced changes to rockfish habitat • Small population dynamics
Puget Sound/ Georgia Basin DPS of yelloweye Rockfish	Threatened 04/28/10	In development	Drake et al. 2010	Yelloweye rockfish within the Puget Sound/Georgia Basin (in U.S. waters) are very likely the most abundant within the San Juan Basin of the DPS. Yelloweye rockfish spatial structure and connectivity is threatened by the apparent reduction of fish within each of the basins of the DPS. This reduction is probably most acute within the basins of Puget Sound proper. The severe reduction of fish in these basins may eventually result in a contraction of the DPS' range.	• Over harvest • Water pollution • Climate-induced changes to rockfish habitat • Small population dynamics

Species	**Listing Classification and Date**	**Recovery Plan Reference**	**Most Recent Status Review**	**Status Summary**	**Limiting Factors**
Puget Sound/ Georgia Basin DPS of Bocaccio	Endangered 04/28/10	In development	Drake et al. 2010	Though bocaccio were never a predominant segment of the multi-species rockfish population within the Puget Sound/Georgia Basin, their present-day abundance is likely a fraction of their pre-contemporary fishery abundance. Most bocaccio within the DPS may have been historically spatially limited to several basins within the DPS. They were apparently historically most abundant in the Central and South Sound with no documented occurrences in the San Juan Basin until 2008. The apparent reduction of populations of bocaccio in the Main Basin and South Sound represents a further reduction in the historically spatially limited distribution of bocaccio, and adds significant risk to the viability of the DPS.	• Over harvest • Water pollution • Climate-induced changes to rockfish habitat • Small population dynamics

2.2.2 Status of Critical Habitat

This section describes the status of designated critical habitat relevant to 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 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 (NOAA Fisheries 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 serving another important role.

In designating critical habitat (CH) for PS Chinook and HC summer-run chum salmon in estuarine and nearshore marine areas[5], NMFS determined that the area from extreme high water extending out to the maximum depth of the photic zone (no greater than 30 meters relative to MLLW) contain essential features that require special protection. For nearshore marine areas, NMFS designated the area inundated by extreme high tide because it encompasses habitat areas typically inundated and regularly occupied during the spring and summer when juvenile salmon are migrating in the nearshore zone and relying heavily on forage, cover, and refuge qualities provided by these occupied habitats.

All physical and biological features (or primary constituent elements) of estuarine, and nearshore marine CH for all three affected salmonid species and canary rockfish and bocaccio CH have been degraded throughout the PS region. The causes for these losses of CH value include human development, including diking, filling of wetlands and bays, channelization, nearshore and floodplain development. The continued growth contributes to the anthropogenic modification of the PS shorelines and is the major factor in the cumulative degradation and loss of nearshore and estuarine habitat. The development of shorelines includes bank hardening and the introduction of obstructions in the nearshore, each a source of structure and shade which can interfere with juvenile salmonid migration, diminish aquatic food supply, and is a potential source of water pollution from boating uses (Shipman et al., 2010; Morley et al., 2012; Fresh et al., 2011).

The degradation of multiple aspects of PS Chinook, HC summer-run chum salmon, PS steelhead, and canary and bocaccio rockfish CH indicates that the conservation potential of the CH is not being reached, even in areas where the conservation value of habitat is ranked high.

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[5] CH for PS steelhead has no marine component.

Table 2 provides a summary of critical habitat information for the species addressed in this opinion. More information can be found in the Federal Register notices available at NMFS’s West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

Table 2. Critical habitat summaries for species 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 PS chinook includes 1,683 mi (2,709 km) of streams, 41 sq mi (106 sq km) of lakes, and 2,182 mi (3,512 km) of nearshore marine habitat in PS. The PS Chinook salmon ESU has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value. Primary constitute elements relevant for this consultation include: 1) Estuarine areas free of obstruction with water quality and aquatic vegetation to support juvenile transition and rearing; 2) Nearshore marine areas free of obstruction with water quality conditions, forage, submerged and overhanging large wood, and aquatic vegetation to support growth and maturation; 3) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation..
Hood Canal summer-run chum	9/02/05 70 FR 52630	Critical habitat for HC summer-run chum includes 79 mi (127 km) and 377 mi (607 km) of nearshore marine habitat in HC. Primary constituent elements relevant for this consultation include: 1) Estuarine areas free of obstruction with water quality and aquatic vegetation to support juvenile transition and rearing; 2) Nearshore marine areas free of obstruction with water quality conditions, forage, submerged and overhanging large wood, and aquatic vegetation to support growth and maturation; 3) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
Puget Sound steelhead	2/24/16 81 FR 9251	Critical habitat for PS steelhead includes 2,031 stream miles (3,269 km). Nearshore and offshore marine waters were not designated for this species. There are 66 watersheds within the range of this DPS. Nine watersheds received a low conservation value rating, 16 received a medium rating, and 41 received a high rating to the DPS.
Puget Sound/Georgia Basin DPS of canary rockfish Puget Sound/Georgia Basin DPS of bocaccio	11/13/2014 79 FR68042	Critical habitat for canary rockfish and bocaccio includes 590.4 square miles of nearshore habitat and 414.1 square miles of deepwater habitat. Critical habitat is not designated in areas outside of United States jurisdiction; therefore, although waters in Canada are part of the DPSs' ranges for all three species, critical habitat was not designated in that area. Based on the natural history of canary rockfish and bocaccio and their habitat needs, NMFS identified two physical or biological features, essential for their conservation: 1) Deepwater sites (>30 meters) that support growth, survival, reproduction, and feeding opportunities; 2) Nearshore juvenile rearing sites with sand, rock and/or cobbles to support forage and refuge. Habitat threats include degradation of rocky habitat, loss of eelgrass and kelp, introduction of non-native species that modify habitat, and degradation of water quality as specific threats to rockfish habitat in the Georgia Basin.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Puget Sound/Georgia Basin DPS of yelloweye rockfish	11/13/2014 79 FR68042	Critical habitat for yelloweye rockfish includes 414.1 square miles of deepwater marine habitat in Puget Sound, all of which overlaps with areas designated for canary rockfish and bocaccio. No nearshore component was included in the CH listing for juvenile yelloweye rockfish as they, different from bocaccio and canary rockfish, typically are not found in intertidal waters (Love et al., 1991). Yelloweye rockfish are most frequently observed in waters deeper than 30 meters (98 ft) near the upper depth range of adults (Yamanaka et al., 2006). Habitat threats include degradation of rocky habitat, loss of eelgrass and kelp, introduction of non-native species that modify habitat, and degradation of water quality as specific threats to rockfish habitat in the Georgia Basin.

2.3 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).

The action area includes all riparian areas, shoreline, and all waters of PS. The shoreline and shallow water habitat in PS has been and continues to be subject to intense development from residential, recreational, municipal, and industrial/commercial construction. The State of the Sound biannual report produced by the Puget Sound Partnership (PSP) (Partnership et al., 2015) summarizes how different indicators of health of the PS ecosystem are changing[6]. Their assessment can be summarized to a few key points: (1) development pressure continues to impact habitat in the marine and freshwater portion of the range; (2) improvements in human use patterns are slow at best; and (3) few of the 2020 improvement targets identified by the PSP will be reached. In more detail, this most recent report points out the following issues:

- Chinook salmon: ongoing decline. PSP Target: Stop the overall decline and start seeing improvements in wild Chinook salmon abundance in two to four populations in each biogeographic region.
- Herring stocks: declining
- Loss of non-federal forested land cover to developed land cover: continuing. Loss of 1,196 acres of non-federal forested land per year between 2006 and 2011.
- Shoreline armoring: Stable between 2011 and 2014. No recent net increase, restoration actions balance out increase from private shoreline armoring. However, this could be related to poor economic conditions. More years of data are needed to determine trend.
- Accelerated conversion/loss of vegetation cover on ecologically important lands: 0.36% loss for 2006-2011. This is even more loss than the cautious 2020 Target: Basin-wide loss of vegetation cover on ecologically important lands under high pressure from development does not exceed 0.15 percent of the total 2011 baseline land area over a 5-year period.
- Marine water Quality: Overall, trends have been getting worse with closures of beaches and shellfish harvest in some bays. While there has been some increase between 2011 and 2014 in the amount of shellfish beds open to harvest, about 19% are still closed. PCB levels in fish[7] are still high.
- Native Eelgrass (*Z. marina*) abundance seems stable comparing 2011 to 2013 data to baseline from 2000 to 2008. This does not account for losses that occurred prior to 2000.

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[6] The Puget Sound Partnership tracks 21 different metrics (vital signs) to measure progress toward different PS recovery goals. The recovery goals most relevant for this Opinion include: Thriving species and food webs, Protected and Restored Habitat, Healthy Water Quality and Quantity.

[7] Monitored species Pacific herring.

- Human Sound Behavior Index: No change in average behavior. Thus, an increase in population is likely to continue to degrade habitat quality. (The Sound Behavior Index tracks 28 human use practices[8] that likely affect habitat and water quality and quantity).
- OWS: not assessed by PSP. Current percent of nearshore coverage is 0.63 percent for all of PS, as detailed below.

The PSP concludes the overall decline in habitat conditions and native species abundance in the PS has been caused by development and climate change pressures. Over the last 150+ years, 4.5 million people have settled in the PS region. With the level of infrastructure development associated with this population growth the PS nearshore has been altered significantly. Major physical changes documented include the simplification of river deltas, the elimination of small coastal bays, the reduction in sediment supplies to the foreshore due to beach armoring, and the loss of tidally influenced wetlands and salt marsh (Fresh et al., 2011). In addition to beach armoring, other shoreline changes including OWS, marinas, roads, and railroads reduce habitat quality. The amount of these changes varies, and their source, varies by region, generally correlating with development, but overall is staggering (Simenstad et al., 2011). The simplification of the largest river deltas has caused a 27 percent decline in shoreline length compared to historical conditions. Of 884 historic small embayments, 308 have been eliminated. About 27 percent of PS's shorelines are armored and only 112 of 828 shoreline segments remain in properly functioning condition. The loss of tidal wetlands in the largest deltas averages 26 percent (Fresh et al., 2011). Each of these habitat changes is related to development and overall reduces the quality and quantity of PS Chinook, HC summer-run, PS steelhead habitat in the PS foreshore and nearshore.

Shoreline armoring often results in increased beach erosion waterward of the armoring, which, in turn, leads to beach lowering, coarsening of substrates, increases in sediment temperature, and reductions in invertebrate density (Fresh et al., 2011;Morley et al., 2012;Dethier et al., 2016). New shoreline armoring continues to reduce the suitable habitat for Pacific sand lance and surf smelt spawning and may reduce their numbers. Fresh et al. (2011) write "We can only surmise how much forage fish spawning habitat we have lost because we lack comprehensive historical data on spawning areas." Considering that these forage fish are an essential food source for salmon, the beach armoring has multiple negative effects on salmon including reductions in prey and reductions in access to shallow water rearing habitat and refuge.

The distribution and sizes of OWS in the nearshore[9] are detailed further in Schlenger et al. (2011) and (Simenstad et al., 2011). The South Central PS sub-basin has the highest number (2,040), density (4 per km), and area of OWS (6.8 km^2) of all sub-basins (Table 3). The South PS sub-basin has the second highest number (1,871) and density (3 per km) of OWS, but only the fourth largest area (0.9 km^2). This disparity in area of overwater coverage between the South Central PS and South PS sub-basins, despite the two having almost the same number of OWS,

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[8] Human use practices include among others: (a) Number of residents with native vegetation on banks of waterways; (b) number of residents using pump stations for boat wastewater; (c) residents using herbicides and pesticides, and (d) pasture practices for residents with livestock.

[9] The nearshore area includes the area from the deepest part of the photic zone (approximately 10 meters below Mean Lower Low Water [MLLW]) landward to the top of shoreline bluffs, or in estuaries upstream to the head of tidal influence (Clancy, M., et al., 2009).

is consistent with the expectation that the structures in the South PS sub-basin would be more commonly associated with residential landowners (and hence typically smaller in size), while the South Central PS sub-basin includes concentrations of large industrial and commercial docks (for example, Commencement Bay). While the South PS sub-basin has a high number of OWS, but a relatively small overwater structure area, the Whidbey sub-basin has approximately one-third as many OWS as the South PS sub-basin (654 versus 1,871), but substantially more area of OWS (0.8 versus 0.5 km^2).

More than one-third (67) of marinas in PS are in the South Central sub-basin, and they cover over 3 square kilometers, which is nearly half of the total PS area covered by marinas (Schlenger et al., 2011). More than 1 percent of the nearshore zone area of the South Central PS sub-basin is covered by marinas. The San Juan Islands – Strait of Georgia sub-basin also has a relatively large number of marinas (40) that cover 2 square kilometers, or 0.3 percent of the sub-basin nearshore area. Moderate numbers of marinas are in the Whidbey (28 total, 1 square kilometers) and South PS (26 total, 0.3 square kilometers) sub-basins. Relatively few marinas were mapped in the Hood Canal (8), North Central PS (6), and Strait of Juan de Fuca (4) sub-basins.

Table 3: Number and Area of OWS in PS Sub-basins

Puget Sound Sub-basins (see Figure 1)	**Number of Overwater Structures *(And Marinas)***	**Number of Structures Per Kilometer of Shoreline**	**Area of Overwater Structures[10] *(Marinas)* (km^2)**	**Total Area of OWS including marinas (km^2)**	**Nearshore Area (km^2)**	**Percent of Nearshore Area Coverage for OWS & Marinas combined**
Strait of Juan de Fuca	213 *(4)*	0.8	0.2 *(0.2)*	0.43	181.4	0.2
San Juan Islands/Strait of Georgia	1,180 *(40)*	1.2	1.2 *(2.0)*	3.26	580.3	0.6
Hood Canal	911 *(8)*	2.8	0.3 *(0.1)*	0.48	154.5	0.3
Whidbey	654 *(28)*	1.2	0.8 (1.0)	1.81	549.5	0.3
North Central Puget Sound	374 *(6)*	1.8	0.2 *(0.2)*	0.6	112.8	0.5
South Central Puget Sound	2,040 *(67)*	4.1	3.7 *(3.1)*	6.78	262.9	2.6
South Puget Sound	1,781 *(26)*	3.2	0.5 *(0.3)*	0.85	287.3	0.3
Puget Sound Basin[11]	**6,927** *(171)*	**2.3**	**6.45** ***(6.3)***	12.78	**2,035.8**	**0.63**

Schlenger et al. (2011) & Simenstad et al. (2011)

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[10] OWS include large industrial/commercial docks, family residence docks, floating docks, fixed piers, bridges, floating breakwaters, moored vessels, but not marinas. Marinas are listed in parentheses.

[11] The Puget Sound Basin number and area of OWS is not a summation of the contributing subbasins, because the sub-basins overlap in shared divergence zones at sub-basin margins.

Figure 1: Puget Sound Sub-basin Boundaries

The effects of climate change and increased population and development also have impacted the freshwater portion of the salmonid habitat. Habitat in tributary watersheds continues to be disconnected, lost, and degraded by diking, operation of hydropower facilities, flow regulation, timber harvest, land conversions, effects of transportation infrastructure, and growth-related commercial and residential development (Beechie et al., 1994; Hough-Snee 2010). Further, water quality reductions, from multiple pollutant sources—stormwater, municipal and industrial discharges, agricultural and non-point source conveyances—continue to compromise water quality in freshwater and marine portions of PS (Ruckelshaus and McClure 2007).

2.4 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.

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. Interrelated actions are part of a larger action and depend on the larger action for their justification. The effects of these actions include those resulting from the construction, maintenance, and future use of each PRF, mooring buoy, marine rail, tram, and staircase.

As introduced in section 1.3, we consider the presence of boats and the use of boats to be indirect effects of the action. Thus, this effects analysis considers the effects from the shading of boats and boat use as an indirect effect of the proposed action. We consider the increased sound pressure levels and noise from pile driving, shading from OWS, and changes in the physical features of habitat related to the structures as direct effects. We identify the multiple lifestages of listed species that will encounter these effects, because different lifestages of a species can respond in different ways to the same habitat perturbations. This effects analysis reviews anticipated actions that will lead to changes in fish behavior, increased predation, and habitat-modifications that will cause injury or death of individual fish.

2.4.1 Effects on Species

Presence and Exposure

As described in Section 1.3 (Proposed Action), in-water construction of each structure will be completed in a work window between July 2 and March 2. Specific work-windows vary depending on tidal reference area and forage fish spawning. These work windows are designed to minimize juvenile salmonid exposure to construction effects. However, they will not completely avoid exposure to construction effects. Further, exposure to long-term effects from the existence of the structure will remain.

Juvenile Salmon. Juvenile PS Chinook and HC summer-run chum salmon will be exposed to both construction effects and the long-term effects of habitat modifications caused by over-water structures. Juvenile Chinook salmon are nearshore oriented (Fresh, 2006) and have been found in PS neritic waters between April and November (Rice et al., 2011). Like juvenile Chinook, juvenile chum salmon are very estuarine and marine nearshore dependent (Salo, 1991) (Simenstad, 2000). Juvenile HC summer-run chum salmon occur in Hood Canal waters between February and May and inhabit shallow nearshore areas for the first weeks of life (Tynan, 1997). Juvenile presence for both species will overlap some with construction windows. Once constructed, all structures are expected to remain in PS, for the life of each structure (approximately 40 years[12]). Thus, juveniles will experience the long-term habitat modifications associated with the presence of these structures.

Steelhead smolts. Puget Sound steelhead yearlings migrate quickly, within weeks, through PS into the Straights and open Ocean. After entry into the estuary, they quickly move into off-shore waters (Goetz et al., 2015). However, steelhead smolts have been found in low abundances in the marine nearshore, outside of their natal estuary, between May and August (Brennan, 2004) (Fresh, 2006). Thus, steelhead smolt exposure is mostly limited to construction effects and effects from boat use in deeper water. As steelhead smolts are not nearshore-dependent, leave PS quickly, and are larger and more mobile than PS Chinook and HC summer-run chum, we expect the direct habitat effects from the structures to be of little importance to steelhead smolts.

Adult Salmon and Steelhead. Adult PS Chinook salmon can reside in PS year-round. Puget Sound Chinook usually inhabit water much deeper than where the proposed structures will be located. Hood Canal summer-run chum salmon return to Hood Canal in early August through September. Chum can swim close to the shore, especially as they get close to natal streams. They mill in front of their stream of origin for 10 to 12 days before entering the river (WDFW and Tribes, 2000). Two general life history types of steelhead co-exist in PS, winter-run and summer-run steelhead. Adult winter-run steelhead typically return to their natal river November through May; summer-run steelhead return between April and October. Their presence in PS will overlap with the construction windows. Like PS Chinook adults, steelhead occupy deep water, generally deeper than the location where the structures are proposed. Thus, we expect the direct habitat effects from the structures to be of little importance to PS Chinook and steelhead adults as they do not frequent the nearshore. We also expect little direct habitat effects to chum as they utilize the nearshore for a short duration and are sufficiently mobile to avoid or swim around the proposed structures. However, adult salmonids may experience noise from pile driving 12-ich diameter pilings as it can affect adults as far from the site of impact as 200 feet, see below.

Puget Sound Rockfish. Rockfish fertilize their eggs internally and extrude the young as larvae (Love et al. 2002). Inflation of the swim bladder has been shown to generally occur within 48 hours after release (McConnell Chaille, 2006). Larval rockfish appear in the greatest numbers during the spring months (Moser and Boehlert 1991; Palsson et al. 2009). However, PS rockfish have been reported to extrude larvae as late as September (Beckman 1998). Yelloweye rockfish in PS have been reported to release larvae from April to September with highest abundances in June and July (Palsson et al. 2009). Rockfish larvae are typically found in the pelagic zone, often occupying the upper layers of open waters, under floating algae, detached seagrass, and kelp. Rockfish larvae are thought to be mostly distributed passively by currents (Love et al. 2002). As reported, rockfish larvae presence can overlap with the work window (July through September) so their exposure to construction effects is likely.

Juvenile bocaccio and canary rockfish 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

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[12] Estimated lifespan of a PRF (pers. com Marine Floats and Thomson Pile Driving).

et al. 2002; Palsson et al. 2009). Juvenile bocaccio rockfish also recruit to sandy zones with eelgrass or drift algae (Love et al. 2002). Love et al. (2002) describe that juvenile canary rockfish occur in groups at the interface between sand and rock outcrops during the day and disperse onto adjacent sand flats at night. In contrast to juvenile bocaccio and canary rockfish, juvenile yelloweye rockfish are not known to typically occupy intertidal or shallow water habitats (Love et al. 1991). Juvenile yelloweye rockfish between 2.5 centimeters and 10 centimeters (approximately 1 and 10 inches, respectively) have been observed in areas of high relief at depths greater than 15 meters (49.5 feet) (Love et al. 2002).

Adult yelloweye rockfish, canary rockfish and bocaccio occur year-round in PS, typically occupy waters deeper than 120 feet (about 36 meters) (Love, 2002), and prefer rocky habitats like Dalco Pass near Tacoma. Deepwater habitats favored by adult rockfish also include extreme slopes of unconsolidated substrates, or sand, shell, and cobble fields often located in the periphery of rocky outcroppings (Palsson, 2009). A few of these deep unconsolidated habitats occur off islands and points in South Sound, like Ketron Island, north of the Nisqually River Delta. However, this preferred habitat is significantly scarcer in South PS than in central and North PS. Yelloweye rockfish have been found to be most common in Hood Canal, less frequent in North and Central PS, and least common in South PS (Palsson et al. 2009). Because of their depth preference, it is extremely unlikely that adult rockfish would be exposed to any of the effects of the proposed action.

Sound Pressure Levels

The proposed action will increase sound pressure levels from pile driving. The noise from pile driving is expected to cause temporary underwater and airborne noise, of which only underwater noise is expected to have adverse effects to listed fish.

Under the proposed action, the installation, of up to 150 new PRFs will be authorized by the COE in the action area over 5 years. The proposed maximum number of pilings per year is 540 (20 pilings per PRF * 30 PRF per year). Therefore, as many as 3,000 pilings will be added to the action area over the 5-year duration of the program. The pilings will vary in size with the largest proposed diameter for steel pilings being 12 inches in diameter. All pile installation will be completed with an impact type pile driver or vibratory pile driver between July 2 and March 2. Pilings for stairs and trams will not be considered as they are usually driven in the dry.

Fishes with swimbladders (including salmonids and rockfish) are sensitive to underwater impulsive sounds (*i.e.*, sounds with a sharp sound pressure peak occurring in a short interval of time). As a pressure wave passes through a fish, the swimbladder is rapidly compressed due to the high pressure, and then rapidly expanded as the “under pressure” component of the wave passes through the fish. The injuries caused by such pressure waves are known as barotraumas. They include the hemorrhage and rupture of internal organs, damage to the auditory system, and death for individuals that are sufficiently close to the source (Abbott *et al.* 2002; Caltrans 2004). Death can occur instantaneously, within minutes after exposure, or several days later.

A multi-agency work group identified criteria to define sound pressure levels where effects to fish are likely to occur from pile driving activities (Hydroacoustic Working Group, 2008). Keep in mind these thresholds represent the initial onset of injury, and not the levels at which fish will be severely injured or killed. The most harmful level of effects is where a single strike generates peak noise levels greater than 206 dB_{peak}[13] where direct injury or death of fish can occur. Besides peak levels, sound exposure levels (SEL) (the amount of energy dose the fish receive) can also injure fish. These criteria are either 187 dB_{SEL}[14] for fish larger than 2 grams or 183 dB_{SEL} for fish smaller than 2 grams for cumulative strikes (Hydroacoustic Working Group, 2008). In addition, any salmonid within a certain distance of the source (*i.e.* the radius where the root mean square (RMS) sound pressure level will exceed 150 dB_{RMS}[15]) will be exposed to levels that change the fish's behavior or cause physical injury (*i.e.* harm). The result of exposure could be a temporary threshold shift in hearing due to fatigue of the auditory system, which can increase the risk of predation and reduce foraging or spawning success (Stadler and Woodbury, 2009). When these effects take place, they are likely to reduce the survival, growth, and reproduction of the affected fish.

To analyze the effects from pile driving, we consulted the Washington State Department of Transportation pile driving guidance (Washington State Department of Transportation, 2014) and the California Department of Transportation Compendium for Pile Driving Sound Data (Illingworth and Rodkin, 2007) for information on sound generated when driving 12-inch diameter pilings; these data are presented in Table 4. Common pile drivers used in PS to install small pilings up to 12 inches in diameter are a compressed-air driven impact hammer and pneumatic vibratory hammer. As we could not find any specific sound impact data for a compressed-air driven impact hammer we use data for a diesel or air/steam hammer, which we believe is the most similar to the air driven impact hammer (pers.com Logan Brown). Sound levels generated when using a diesel hammer, like for the Point Isabell Foundation, generally result in higher sound levels compared to a drop hammer installation, as used for the Sausalito Dock, Table 4. The Mad River project is an example with vibratory pile driving which demonstrates the lower decibel levels from this type of driver. Since there has been considerable variability in the amount of sound attenuation achieved during pile driving tests (Buehler et al., 2015), for the purpose of this analysis we assumed no sound pressure level reduction from the attenuation measures, providing the analysis for a worst case scenario.

Table 1. Pile driving sound pressure levels and sound exposure data from Illingworth and Rodkin (2007)

Source	**dB_{peak}**	**dB_{RMS}**	**dB_{SEL}**
Point Isabell Foundation: 12-inch steel pile with diesel hammer in shallow water	192	177	174*
Sausalito Dock: 12-inch steel pile with drop hammer in shallow water	177	165	152
Mad River: 13-inch steel pile with vibratory hammer	171	155	155

*SEL available for 14-inch piling, only.

We used the following assumptions for estimating the effects of the pile driving component of the proposed action on juvenile and adult salmon and steelhead and juvenile rockfish.

- Pilings will not exceed 12-inches in diameter.
- The proposed number of total pile strikes per project per day will not exceed 300.

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[13] dB_{peak} is referenced to 1 micropascal (re: 1µPa or one millionth of a pascal) throughout the rest of this document. A pascal is equal to 1 newton of force per square meter).

[14] dB_{SEL} is referenced to 1 micropascal-squared·seconds (re: $1\mu Pa^2 \cdot sec$) throughout the rest of this document

[15] dB_{RMS} is referenced to 1 micropascal (re: 1µPa) throughout the rest of this document

- Pile strikes for one piling don't exceed 50.
- The proposed number of projects per year will not exceed 30 new PRFs.
- The maximum number of pilings that can be driven annually will not exceed 600 = 20 pilings/project * 30 projects.
- Puget Sound Chinook salmon juveniles in the vicinity of pile driving activity during the work window will weigh more than 2 grams. This is based on fork length data of juvenile salmonids passing through the PS nearshore (Rice, 2011). After July 2 juvenile Chinook can be expected to be longer than 80 mm fork length (FL). Weight of 80 mm FL Chinook ranges above 4 grams (McFarlane and North, 2002).
- Densities of PS Chinook juveniles in the PS nearshore average 25 fish per hectare in July and 14 fish per hectare in August (Rice 2011).
- The density of steelhead smolts in the vicinity of pile driving is extremely low and all steelhead smolts in PS are larger than 2 grams.
- HC summer-run chum remain in the Hood Canal nearshore till they are about 50 mm in size (WDFW and Tribes, 2000) and they may weigh less than 2 grams when exposed to pile driving.
- Larval and juvenile listed rockfish may be present in the nearshore during impact pile driving. Exposure of adult rockfish to construction effects is discountable since they do not occupy the nearshore.
- In-water work windows in PS range between July 2 and March 2, depending on tidal reference area; in Hood Canal from July 16 to March 1
- Strait of Juan de Fuca: Port Townsend, Sequim Bay juvenile chum emigrate a month later than other HC summer run chum.
- Adults of listed salmonids may be present during piling installation.
- If an impact hammer (e.g., drop, hydraulic, diesel, or sledge hammer) is used to drive or proof steel pilings, one of the following sound attenuation methods will be employed:
    - Placement of a 6-inch-thick piece of wood, mica, or similar material between the hammer and pile.
    - Use of a bubble curtain that distributes air bubbles around 100% of the perimeter of the piles over the full depth of the water column.

Instantaneous Injury. We estimated (using Point Isabell Foundation data) the sound pressure levels will be 192 dB_{peak}, 174 dB_{SEL}, and 177 dB_{RMS}. For instantaneous injury impacts, we assume a high likelihood of injury to salmonids from instantaneous pulses of sound pressure levels above 206 dB_{peak} (FHWG 2008). For this program the worst case scenario estimated sound pressure levels generated by pile driving of 12-inch steel pilings (192 dB_{peak}) are expected to be below the instantaneous injury threshold. Thus, there is little potential for instantaneous injury form single strike peak pressure to juvenile or adult salmonids or rockfish.

Cumulative Strike Effects. We used the NMFS spreadsheet calculator[16] to estimate the potential effect of cumulative strike effects on fish. For this it is necessary to estimate the number of strikes deployed in a day, 300 for this program, in addition to knowing the sound pressure level resulting from each individual strike. The model used by NMFS assumes that

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[16] http://www.dot.ca.gov/hq/env/bio/fisheries_bioacoustics.htm

cumulative effects ‘reset’ overnight based on assumed fish movement, so only strikes in a single day are counted toward cumulative impacts.

First, we will analyze the effects on juvenile salmonids. As mentioned above, cumulative injury to salmonids is possible above 187 dBSEL for salmonids weighing greater than 2 grams, and above 183 dBSEL for salmonids weighing 2 grams or less. We expect juvenile Chinook in the PS nearshore during the work window, after July 1, to range in fork length above 80 mm and to weigh more than 2 grams (Rice et al., 2011) (McFarlane and North, 2002). HC summer-run chum emigrate quickly after emergence and can weigh less than 2 grams when in the HC nearshore in February, when the work window potentially overlaps with occurrence (WDFW and Tribes, 2000). While we can speculate that most fish will move away from the general work area, we cannot anticipate with any certainty what a fish will do when in-water work and pile driving begin. Anecdotal evidence even suggests that some fish are attracted to the turbidity created from pile driving. Therefore, we conservatively analyze the effects to fish as if they experience the effects from pile driving with the maximum proposed number of 300 strikes per project. Using the NMFS calculator, we expect cumulative piles strikes for each project to have adverse effects to listed fish within 200 feet for fish larger than 2 grams and 369 feet for fish smaller than 2 grams, Table 5.

We approximate the area of adverse effects to juveniles larger than 2 grams for each inwater structure as 84,496 square feet and for juveniles smaller than 2 grams 292,246 square feet. This is the area of one circle with the distance within which harm can occur used as the radius. While individual pilings may be as far as 160 feet from each other, at opposite ends of the structure, the cumulative SEL for each project would only be reached where all sound effects overlap. Further, for the most landward pilings, the area where sound could be transmitted through water and adversely affect juveniles is a half circle. Thus, approximating the area where adverse effects are likely to occur as a circle is sufficiently conservative.

Table 2. Sound Effects from RGP-6 Pile driving

Input values for single strike noise			Onset of Physical Injury			Behavior
Peak	SEL	RMS	Peak	Cumulative SEL dB**		RMS
192	**174**	**177**	dB	Fish ≥ 2 g	Fish < 2 g	dB
Threshold values from (Hydroacoustic Working Group, 2008 #2128@@author-year)			206	187	183	150
Distance to threshold			**0 m**	**200 ft/ 61m**	**369 ft/ 113m**	**2070 ft/ 631m**
Approximate Area affected				125,427 square feet/ 1.17 hectares	428,278 square feet/ 3.98 hectares	125 hectares

We do not have specific data on the number of juvenile fish that will be present near each of the proposed structures during in-water work. Hood Canal summer-run chum exposure is only likely in February, at the very beginning of their emigration, and depends greatly on location. Hood Canal summer-run chum will weigh less than 2 grams. We expect very few PS steelhead smolts to occur in the nearshore during July and August, as discussed in the status section Densities of juvenile PS Chinook vary with time and location (Rice et al., 2011). Juvenile densities are highest at the beginning of the work window in July and then drop off rapidly.

Average juvenile Chinook salmon densities in July range around 24 fish per hectare and around 14 fish per hectare in August (Rice et al., 2011).

We determined the approximate area affected by cumulative SEL above the harm threshold for each PRF to be 125,427 square feet/ 1.17 hectares for fish larger than 2 grams. With the conservative assumption that all projects will be constructed in July and August, we estimate that a maximum of 1240 juvenile Chinook (24 Chinook/hectare x 1.17 hectare * 3 days pile driving per project * 15 projects per each month) in July and 732 in August will be exposed to injurious noise from annual pile driving annually. However, the average numbers of PS Chinook smolts that will be exposed to injurious noise will likely be much lower as our conservative assumptions estimated the maximum possible impact from RGP-6 by assuming that: (1) all projects would occur in PS in July and August, (2) every project would install the maximum number of 18 pilings; (3) juveniles would experience the SEL from pile driving of about 6 pilings (50 pile strikes per one piling) or 300 pile strikes total spread out over one day.

HC summer-run chum juveniles could experience sound effects in February as emigration begins as early as mid-February (Tynan, 1997). As they are smaller than 2 grams, they would be affected by cumulative strike effects within 369 feet of impact pile driving and along 738 feet off shoreline for each project. Exposure would be largest close to HC summer-chum spawning rivers. We do not have average areal densities to estimate numbers of affected juveniles when construction occurs in February. As projects in HC are usually limited to less than 10 per year and construction is spread out over the entire 7-month work window, the number of juveniles likely to be impacted by pile driving in February is small. However, if several projects would be constructed close to HC summer-chum spawning rivers in February, the number of juveniles affected of one or a few populations could be substantial.

As for the effects to adults, in general, most adult PS Chinook and steelhead are actively migrating and then holding at the mouths of natal rivers. Residential construction within a mile of the mouths of natal PS rivers is unlikely as land use at the mouths of major PS rivers is already either industrialized (Puyallup), restored (Nisqually), mostly in agricultural use (Samish, Skagit, Stillaguamish), or in a combination of agriculture and restoration (Nooksack). Thus, we do not expect that pile driving for this program will occur in areas where PS Chinook adults are likely to hold, close to the mouths of rivers. We expect them to swim past the shorelines of other PS areas and through the cumulative strike effects area, 400 feet diameter circle, in a few minutes. They would likely experience a maximum of 50 pile strikes from driving of one piling during this time, which greatly reduces the likelihood that they will incur any adverse effects from pile driving. The SEL for 50 strikes would result in harm within 60 feet of the pile driving. Since adult PS Chinook and steelhead will experience a low number of strikes, will be actively migrating, and are not likely to swim within 60 feet of the PS shoreline, we do not expect the cumulative strike effects to rise to the level of injury or death of any adult PS Chinook salmon or steelhead.

Adult HC summer-run chum return to spawn in late summer, August and September (Tynan, 1997). Most adults are actively migrating through deep waters of HC and then holding at the mouths of natal tributaries. Different from PS, where some fall chum spawning rivers enter into narrow inlets and chum use shallow water along most of the inlet, HC spawning rivers empty directly into the wide marine waters of HC and adult HC summer-run chum use deep marine areas until they get within a mile or less to their natal streams. Also different from PS, in HC there is the possibility for residential development and associated shoreline structures as proposed under RGP-6 to be built within a mile of HC summer-run chum natal streams. For example, residential development on the west shore of Quilcene bay extends to within half a mile of the Quilcene estuary and residential development includes areas immediately adjacent to Big Beef Creek. Thus, impact pile driving in late summer within a mile of natal HC summer-run streams is possible and has the potential to affect adult chum. Adult chum, which are holding rather than migrating, could be impacted within 200 feet of impact pile driving close to natal estuaries. Effects from sound to adult females may include harm to eggs, an effect that has not been researched so far (Hastings and Popper, 2005) (pers.com. Stadler 2015). However, we expect few adult chum to be affected by impact pile driving because usually fewer than 10 new PRFs are built in Hood Canal per year, project construction is spread out over 7.5 months, and most projects will not be in close proximity to natal HC summer-run chum spawning streams.

Little information is available on the effects of underwater sound on rockfish (Hastings and Popper, 2005). However, all fish with swimbladders are likely affected by underwater sound and we use the same assumptions and methodology to estimate effects on rockfish as we established for salmonids. As mentioned above, cumulative injury to fish weighing 2 grams or less is likely above 183 dB_{SEL} and for the proposed RGP-6 program likely within 369 feet (113 meters) of the construction site. We determined the approximate area of affect for each PRF to be 428,278 square feet/ 3.98 hectares for fish 2 grams or smaller.

For an estimate of maximum likely exposure of rockfish larvae to sound, we used the following assumptions and data:

- Maximum larval abundance reported for a time during the proposed work window at 50 larvae per 1,000 cubic meters in August from subtidal sampling sites applicable to the shallow water construction sites (Greene, 2012), see below.
- Using data from Palsson (2009), we estimated that an average of 19 percent of these individuals could be listed rockfish[17].
- The average volume of water depth of the area where PRFs are installed ranges around 3 meters and the resulting volume of water affected by cumulative sound exposure is 120,000 cubic meters.

Areal abundances of rockfish larvae vary annually and seasonally (Chamberlin et al. 2004). In the San Juan Islands, (Weis, 2004) found combined larval densities ranging between 0 and 15 per 1,000 cubic meters with highest abundances occurring in April. Abundances in July dropped to one (standard deviation (SD) of plus or minus one) larvae per 1,000 cubic meters. Chamberlin et al. (2004) also reports larval abundances in the San Juan Archipelago to be highest in April and early May and then dropping off to two (SD plus or minus 10) larvae per 1,000 cubic meters at the end of May. To get more recent and a broader estimate of the spatial distribution of larvae, NMFS sampled for larval fish at 77 subtidal sites (5 to 40 meter depth) across PS from April through October 2011. Larval rockfish were present in an early spring and a late summer peak that both coincide with the primary production peaks in PS. Rockfish larvae

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[17] 14 percent for San Juan, 15 percent for Hood Canal, less than 2 percent for South PS were Listed rockfish (Palsson, 2009)

essentially disappeared from surface waters by the beginning of November. Densities were lower in the more northerly basins compared to the Central and South PS. highest abundances occurred in Central PS in May with 80 larvae per 1,000 cubic meters and in Rosario and Admirality Inlet in August with close to 50 larvae per 1,000 cubic meters (Greene, 2012).

Our resulting conservative estimate for the number of rockfish larvae exposed is 896,000 rockfish[18] over the life of the RGP-6 program[19]. This number is very conservative as it is based on the assumption that all pile driving would occur prior to November when larval abundance usually has dropped off to extremely low abundance. While we have no larvae to adult survival estimates for rockfish, the fecundity of a large female listed rockfish, which ranges between several thousand and one million larvae, provides a context for that number. Assuming a productivity around one, these numbers would mean that over the duration of the RGP-6 program, impact pile driving could at worst affect two adult equivalent listed rockfish.

Juvenile Boccaccio and Canary rockfish may occur in sandy and vegetated shallow habitat and some exposure to pile driving noise is thus likely. We do not have areal abundances for juvenile rockfish and thus cannot estimate the number of exposed individuals. However, overall we believe that the number of juveniles likely affected will be relatively small for the following reason: (1) We expect most juvenile rockfish to occur in rocky habitat where no pile driving will occur, not in areas where most PRFs will be built; (2) the maximum area in which fish weighing more than 2 grams would be affected by pile driving annually is small, 35 hectares, compared to 203,580 hectares of available nearshore habitat in PS (Schlenger et al., 2011). That is less than 0.02 percent of the nearshore area affected annually and 0.09 percent over the 5 years of the program for a maximum duration of 3 days (each project expects to complete pile driving within 3 days).

Therefore, we estimate that a maximum of (a) 1,972 juvenile (10 adult equivalents[20]) PS Chinook, (b) few juvenile HC summer-run chum, unless construction would mostly occur in February which could affect higher numbers of juveniles, (c) depending on timing and location of pile driving in HC, some adult HC summer-run chum, (d) very few if any juvenile steelhead, (e) a maximum 896,000 listed rockfish larvae (two adult equivalents), (f) very few listed juvenile rockfish, and (g) no adult PS Chinook, steelhead, or rockfish will be injured by the cumulative effects of sound exposure levels above 187 dB_{SEL} over the 5-year life of the RGP-6 program. These injuries include injuries to non-auditory tissues as well as temporary threshold shifts in hearing sensitivity. This indicates that these fish will be exposed to sound pressure levels that can directly injure their tissues or reduce the hearing capability of the auditory system; which can lead to reductions in survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success (Stadler and Woodbury, 2009).

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[18] 896,000 rockfish for 150 projects = 3 meters (average depth) * 39,788 m^2 * 50 rockfish/ 1,000 m^3 * 150 projects

[19] Different than for PS Chinook we considered the number of fish harmed over the life of the program as rockfish are a long-living species rather than a population that is measured by annual abundance.

[20] Adult equivalents is calculated by multiplying the juveniles times the smolt to adult return rates (SAR) for salmon. We used an average SAR of 0.48% for PS Chinook derived from eight individual SARs provided by PS hatcheries, http://wdfw.wa.gov/hatcheries/hgmp/2012_puget_sound.html

Behavioral Effects. We calculated an instantaneous sound pressure level of 177 $\mathrm{dB_{RMS}}$, for 12-inch piles, which is above the 150 $\mathrm{dB_{RMS}}$ threshold where we believe behavioral effects to salmonids can occur. Using the NMFS calculator, sound pressure levels would attenuate to below 150 $\mathrm{dB_{RMS}}$ within 2,070 feet of impact pile driving for an area of 13,455,429 square feet (125 hectares) around each pile. However, only about half of that area is actually waterward of the ordinary high water mark (OHWM), so only about 6,728,000 square feet (62 hectares) is in the water where fish may experience effects. Behavioral effects will extend into deeper areas where steelhead smolts and adults may be exposed. As we expect juvenile PS Chinook and HC summer-run chum to utilize mainly nearshore habitat, the impact to these juveniles can better be described as affecting shallow habitat along 4,140 feet of shoreline per project.

We expect varying levels of behavioral responses from no change, to mild awareness, or a startle response (Hastings and Popper, 2005), but we do not believe that this response will alter the fitness of any adults. However, a small number of juvenile salmonids and rockfish may exhibit a behavioral response from pile driving that can lead to changes in feeding behavior or movement to a location where they are predated on, which will produce an effect that may kill or injure a listed juvenile.

Vibratory Driver. Vibratory hammers have not been observed to cause injury or death to fishes or other aquatic organisms. This may be due to the slower rise time (the time taken for the impulse to reach its peak pressure) and the fact that the energy produced is spread out over the time it takes to drive the pile (Washington State Department of Transportation, 2014). We anticipate that vibratory pile driving will cause only minor behavioral effects to adults but may cause behavioral changes in juvenile steelhead, juvenile Chinook salmon, and juvenile HC summer-run chum that can lead to predation (see behavioral effects section above for more detail).

Effects of Migratory Pathway Obstruction

Piers ramps and floats create a sharp edged shadow. In addition, most PRFs in PS have one or two boats associated with them. While new floats are generally grated, boats and floating boat lifts are not. Thus, the boat and the floating boat lift often create more shade than the PRF itself. The additional shading from the floating boat lift and boat add to the negative effects on juvenile migration, SAV, and salmonid forage (2.4.2) described below.

Based on the findings of numerous studies, we are reasonably certain that the placement of PRFs and associated floating boat lifts and boats in shallow water will adversely affect juvenile salmonid migration. Juvenile salmon in the marine nearshore as well as in freshwater have been reported to migrate along the edges of shadows rather than through them (Nightingale and Simenstad, 2001; Southard et al., 2006; Celedonia et al., 2008a; Celedonia et al., 2008b; Ono, 2010; Moore et al., 2013; Munsch et al., 2014). In freshwater, about three-quarters of migrating Columbia River fall Chinook salmon smolts avoided a covered channel and selected an uncovered channel when presented with a choice in an experimental flume setup (Kemp et al., 2005). In Lake Washington, actively migrating juvenile Chinook salmon appeared to change course when they approached a structure, swimming around structures through deeper water rather than remaining in shallow water and swimming underneath a structure (Celedonia et al., 2008b). Structure width, light conditions, water depth, and presence of macrophytes appeared to influence the degree of avoidance, with juvenile Chinook salmon appearing less hesitant to pass beneath narrower structures. Finally, juvenile Chinook salmon appeared to move into deeper water to travel beneath or around structures (Celedonia et al. 2008b).

In the marine nearshore, there is also substantial evidence that OWS impede the nearshore movements of juvenile salmonids with fish stopping at the edge of the OWS and avoiding swimming into the shadow or underneath the structure (Heiser and Finn 1970; Able et al., 1998; Simenstad 1999; Southard et al., 2006; Toft et al., 2007; Ono 2010). In the PS nearshore, 35 millimeter to 45 millimeter juvenile chum and pink salmon were reluctant to pass under docks (Heiser and Finn 1970). Southard et al. (2006) snorkeled underneath ferry terminals and found that juvenile salmon were not underneath the terminals at high tides when the water was closer to the structure, but only moved underneath the terminals at low tides when there was more light penetrating the edges. Ono (2010) reports that juveniles tended to stay on the bright side of the shadow edge, two to five meters away from the dock, even when the shadow line moved underneath the dock. These findings suggest that overwater-structures can disrupt juvenile migration in the PS nearshore.

An implication of juvenile salmon avoiding OWS is that some of them will swim around the structure (Nightingale and Simenstad 2001). This behavioral modification will cause them to temporarily utilize deeper habitat, thereby exposing them to increased piscivorous predation. Hesitating upon first encountering the structure, as discussed, also exposes salmonids to avian predators that may use the floating structures as perches. Typical piscivorous juvenile salmonid predators, such as flatfish, sculpin, and larger juvenile salmonids, being larger than their prey, generally avoid the shallowest nearshore waters that outmigrant juvenile salmonids prefer—especially in the earliest periods of their marine residency. When juvenile salmonids temporarily leave the relative safety of the shallow water, their risk to being preyed upon by other fish increases. This has been shown in the marine environment where juvenile salmonid consumption by piscivorous predators increased fivefold when juvenile pink salmon were forced to leave the shallow nearshore (Willette, 2001).

Further, swimming around OWS lengthens the salmonid migration route, which has been shown to be correlated to increased mortality. Migratory travel distance rather than travel time or migration velocity has been shown to have the greatest influence on survival of juvenile spring Chinook salmon migrating through the Snake River (Anderson et al., 2005). In summary, NMFS assumes that the increase in migratory path length from swimming around the float as well as the increased exposure to piscivorous predators in deeper water likely will result in proportionally increased juvenile PS Chinook and HC summer-run chum mortality.

While the studies discussed above mostly examined larger OWS than proposed under RGP-6, NMFS is reasonably certain that the results reported for larger OWS, where juvenile salmon avoid shaded areas under large structures, concentrate at the edge of structures, and/or are pushed into deeper waters where predation increases, are also likely to occur for residential floats—though likely to a lesser degree. The above referenced studies lead NMFS to the conclusion that an increase of predation on juvenile Chinook and HC summer-run chum salmon as a result of modified migration and schooling behavior is reasonably certain to occur from the presence of PRFs, associated boat lifts, and boats in the nearshore.

Unlike salmonids, juvenile and adult rockfish behaviors (such as foraging and migration) and risk of predation are not known to be adversely impacted by artificial structures such as piers and docks (Love et al., 2002). The aggregation of some rockfish near docks, piers, and other artificial structure suggests that, harm is unlikely to occur from those structures. As they select for habitat types with submerged structure also suggests that, different from salmonids, associated elevated noise levels from boat traffic near these structures may not significantly disturb rockfish.

Reduced Salmonid Vision and Feeding

The reduced light regime under OWS is also likely to result in temporarily decreased visual ability and decreased feeding success for those juveniles that do swim under residential floats in PS. In freshwater laboratory studies, schools of Pacific salmon disbanded and stopped feeding when light dropped below the rod[21] threshold (Ali, 1959). Juvenile chum and pink salmon take 30 to 40 minutes to fully adapt to dark conditions, and 20 to 25 minutes to adapt to increased light conditions. During the adaptation period to the new light regime the visual acuity is diminished, depending upon the magnitude of the light intensity contrast. NMFS expects that the light adjustment period for juvenile salmon that swim under small grated residential floats will generally be much shorter that the above referenced 20 to 40minutes, because the reduction in light may not drop below the rod threshold during bright days. However, NMFS expects that there will be situations when the ambient light regime under floats will drop below the rod threshold. In those instances, the adverse effects of temporarily decreased visual ability and resulting decreased feeding success are considered reasonably likely to occur from the long term operation of the proposed PRF. While the short-term decreased feeding success will likely result in a minor sub-lethal response of incrementally reduced growth, the decreased visual ability can lead to predation.

Noise from Watercraft

Most of the PRFs in PS are used to moor watercraft and their use 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

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[21] Rods are photoreceptors in the retina of the eye responsible for peripheral and night vision.

(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 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.

These documented behavioral and physiological responses to disturbance from boat noise divert time and energy from other fitness-enhancing activities such as feeding, avoiding predators, and defending territory. In PS, PRF are generally used to moor one or two boats and thus the addition of 150 new PRFs over the life of the program would result in a substantial increase in boating activity and noise disturbance in the action area. This will increase fish disturbance from engine noise, propeller movement, and the physical presence of boats and humans, including fishing activities. All of these are likely to disturb salmonids, cause them to at least temporarily leave an area, and experience sublethal physiological stress all of which increases the likelihood of injury and being predated on. Different from a onetime disturbance related to construction noise, the increase in boat noise associated with the program presents a chronic condition that will persist for the life of the PRFs. Therefore, it is reasonable to expect that some fish will exhibit a behavioral response to watercraft noise that ultimately leads to their injury or death.

Water Quality

Use of ACZA-Treated Wood.

The proposed action allows for ACZA-treated pilings to be used outside of forage fish spawning habitat or State-owned aquatic lands, only. All treated wood, pilings and above water ACZA-treated wood, needs to meet post treatment BMPs (section1.3.), which are designed to reduce leaching. In any one location, a maximum installation of 20 pilings per PRF is proposed. In addition, the use of ACZA-treated structural wood (stringers) which is commonly used in above water portions of piers and floats is not restricted in the proposed action. Treated wood for decking is rare as most builders have switched to plastic lumber, metal grating, and untreated wood.

The proposed ACZA-treated wood in and above water will leach some of the metals used for wood preservation into the environment. 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, Stratus 2006) and low level sublethal effects on olfactory function (Hecht et al. 2007, McIntyre et al. 2012). Copper is also likely to leach from those recreational vessels treated with anti-fouling paint which we expect to be associated with a few of the proposed structures (Sommers et al. 2016).

The increase in dissolved copper concentration depends on many factors, including the amount of treated wood present, the leaching rate, BMPs applied, and water chemistry. Leaching from ACZA-treated wood has been shown to be highest during the first few weeks after installation and then decrease sharply to low levels. Post-treatment BMPs have been shown to further reduce initial leaching amount and duration (Stratus 2006). In addition to the amount of copper entering the water via leaching, concentrations of dissolved copper adjacent to the proposed structures depend on flow/mixing conditions, and water quality parameters including salinity, and pH (Stratus 2006). Aside from slack tides, we expect generally moderate dilution from tidal-induced water movement around the proposed structures. Further, salinity has been shown to decrease leaching of copper from ACZA-treated wood (Stratus 2006). In summary, we expect generally low copper concentrations in water and sediment around structures containing treated wood because of the low number of ACZA-treated pilings and above water treated wood, proposed post-treatment BMPs, generally good dilution, and low leaching in saltwater.

Sub-lethal concentrations of dissolved copper have been shown to impair olfactory function in salmon in freshwater (Tierney et al., 2010). This copper-induced loss of smell leads to a reduction in predator avoidance (McIntyre et al., 2008). Further, fish have shown avoidance of sub-lethal levels of dissolved copper in freshwater (Giattina et al. 1982). While the avoidance behavior persisted in saltwater, no impairment of olfactory function in salmon has been found in saltwater (Sommers et al., 2016). Thus, we believe that the effects of the proposed action will be restricted to behavioral responses, mainly the avoidance of waters around the proposed structures in which elevated, sub-lethal dissolved copper concentrations occur.

As discussed above, we expect the occurrences of elevated copper concentrations to be limited in space, time, and duration. Affected areas are under and around proposed structures, the duration of potentially elevated dissolved copper levels is mostly limited to within two weeks after installation of any treated wood. Further, exposure to elevated levels of dissolved copper is likely intermittent, occurring mainly during slack tides when dilution is lowest. This low-level, short-term, intermittent exposure of fish to elevated dissolved copper concentration in areas immediately around the proposed structures in combination with the protection of saltwater from impacts to olfaction leads us to believe that negative effects will be small. While some fish are likely to encounter short-term elevated sub-lethal levels of dissolved copper, their response will likely be mostly behavioral and not relevant on a population level.

Watercraft-related water quality impacts. Accidental releases of fuel, oil, and other contaminants that can injure or kill aquatic organisms, are reasonably likely to occur from watercraft use at the permitted structures. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAHs), which can kill listed fish at high levels of exposure, and can cause sublethal, adverse effects at lower concentrations (Meador et al. 2006). We anticipate PAH releases will be intermittent, infrequent, and limited to very small quantities (ounces) and therefore effects to fish are likely to be at the sublethal level, such as reduced foraging success, reduced growth, or avoidance of an area. Overall we expect the water quality impacts to be very minor in magnitude.

Turbidity and Suspended Sediment from Pile Driving. Pile driving and installation of mooring buoys 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, 1988; Simenstad, 1988), 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). In that study, TSS concentrations associated with activation of the vibratory hammer to loosen the pile from the substrate ranged from 13 to 42 milligrams per liter (mg/L) and averaged 25 mg/L. During the pile driving, elevated levels of TSS averaging 40 mg/L were recorded near the pile and 26 mg/L at the sensors located 16 to 33 feet from the pile. Concentrations during extraction ranged from 20 to 82.9 mg/L, and were sometimes visible in the water column as a 10- to 16-foot diameter plume that extended at least 15 to 20 feet from the actual pulling event. Although concentrations decreased after pile extraction, the time interval was unavailable due to tug movement as soon as the pile cleared the water’s surface.

To consider how the TSS generated from vibratory pile driving might affect juvenile PS Chinook, NMFS used the Weston Solutions (2006) data as an estimate for the range of expected TSS and Newcombe and Jensens (1996) ‘scale of ill effects’ to determine likely associated biological responses. For an exposure duration of up to two hours and an increase in TSS over background of up to 240 mg/L, the calculated severity of ill effect for juvenile salmon does not exceed a behavioral effect of short-term reduction in feeding rates and feeding success (the fish is startled, experiences reduced vision, stops feeding to reorient, and may swim away). The maximum increase in TSS reported in Weston Solutions (2006) is 83 mg/L. Even if the pile driving that is part of the RGP-6 program would result in double the TSS as reported for vibratory pile driving in Weston Solutions (2006), the likely level of TSS is well below levels and durations that could result in injurious physiological stress. Further, 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 marine nearshore—which is regularly subject to strong winds and currents that generate suspended sediments. Thus, the juvenile salmonids likely will have encountered similar turbidity before. In summary, the short duration of the proposed pile driving (a few minutes per piling), generally low level expected increase in TSS, and small affected area renders the effects of the increased TSS on juvenile salmonids not meaningful.

We did not find any literature specific to effects of TSS and turbidity on rockfish larvae or juveniles. The closest surrogate for TSS effects to rockfish larvae we found is an investigation of the effects on Pacific herring larvae (Griffin et al., 2012). Pacific herring exhibited no mortalities during or following continuous exposure to a concentration of 250 mg/L for 16 hours (Griffin et al., 2012). As the duration of this exposure is above what we expect for pile driving and in the range of TSS observed from pile driving, it is reasonable to assume that effects from TSS and turbidity on rockfish larvae are unlikely to rise to the level of take. For rockfish juveniles we assume that their response will be similar to rockfish larvae or salmon and thus also unlikely to rise to the level of take.

Mitigation

We expect that the mitigation will result in significant benefits to nearshore marine habitat, see 2.4.2. These benefits in habitat suitability will translate in proportionally increased abundance and productivity of forage species and listed fish. For example, mitigating via increasing riparian vegetation will result in more autochtonous input to the nearshore including insects. These insects serve as food and will in times of food limitation increase growth, individual fitness, and survival of fish. Removing or reducing shoreline hardening as mitigation has multiple habitat benefits (Dethier et al., 1216; Toft et al., 2013) including, depending on site-specific conditions, re-establishment of shallow water habitat and retention of finer grained sediments. The availability of shallow water habitat will likely proportionally reduce the risk of juveniles being eaten by larger fish. Finer grained sediment as well as forage fish spawning supplementations will, when in forage fish spawning areas, result in increased forage fish spawning success and likely increased forage abundance for listed fish. This increased food abundance will in times of food limitation translate into increase growth, individual fitness, and survival. Overall, restoration will address factors in the marine nearshore that at times limit individual fitness, survival, and productivity. Thus, we are reasonably certain, that the mitigation will proportionally increase abundance and productivity of listed fish. We expect, that as intended, it will offset some of the losses that likely will be incurred from the existence of the new overwater and nearshore structures.

2.4.2. Effects on Critical Habitat

The designations of critical habitat for PS Chinook, HC summer-run chum, and PS steelhead use the term primary constituent element or essential features. The new critical habitat regulations (81 FR 7214) 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 primary constituent elements, physical or biological features, or essential features. In this biological opinion, we use the term PBF to mean primary constituent elements or essential feature, as appropriate for the specific critical habitat.

The proposed 150 PRFs including associated boats, boat lifts, and a 10-foot impact buffer (Ehinger et al., 2015) would affect an estimated 351,000 square feet of nearshore habitat which amounts to an impact of an additional 0.002 percent of the nearshore. Impacts from stairs and trams would be smaller. The proposed actions have effects in riparian areas, shoreline, shallow water, and deeper water. Designated critical habitat within the action area for ESA-listed salmon and steelhead considered in this opinion consists of estuarine and marine rearing sites, migration corridors, and their essential physical and biological features. Effects of the proposed RGP-6 program within critical habitat are reasonably certain to include: (1) obstruction of the migratory pathway, (2) reduction in forage and natural cover, and (3) reduction of water quality. We discuss each of these effects in turn below.

Obstruction of Migratory Pathway and Safe Passage

The proposed program will authorize as many as 150 PRFs over 5 years plus associated mooring buoys, floating boat lifts, and stairs in PS. Each of these structures will alter outmigration routes of juvenile salmonids to some degree, mainly to PS Chinook and HC summer-run chum salmon. At each structure, juveniles will likely alter their migratory route and move into deeper water. Forcing juveniles to leave the shallow nearshore and increasing their migration route will likely increase predation, see above 2.4.1. Therefore, we expect the RGP-6 program to degrade the quality of the migratory corridor and impair safe passage.

Effects on Forage and Cover

Residential PRFs and associated boat use adversely affects primary productivity and submerged aquatic vegetation (SAV) if present in the shadow zone of the OWS. Submerged aquatic vegetation is important in providing cover and a food base for juvenile PS Chinook and HC summer-run chum salmon. Pier ramp and floats shade SAV for the life of the structure (Kelty and Bliven, 2003). Additionally, the turbidity from boat propeller wash decreases light levels (Eriksson et al., 2004). Shafer (1999; 2002) provides background information on the light requirements of seagrasses and documents the effects of reduced light availability on seagrass biomass and density, growth, and morphology. Her literature review avers that decreased ambient light typically results in lower overall productivity, which is ultimately reflected in lower shoot density and biomass. In contrast to other studies in the Pacific Northwest, Shafer (2002) specifically considers small residential OWS and states, “much of the research conducted in PS has been focused on the impacts related to the construction and operation of large ferry terminals. Although some of the results of these studies may also be applicable to small, single-family docks, there are issues of size, scale, and frequency of use that may require separate sets of standards or guidelines. Notwithstanding, any overwater structure, however small, is likely to alter the marine environment.”

Fresh et al. (2006) researched the effects of grating in residential floats on eelgrass, a substrate for herring spawning, a Chinook salmon forage species. They reported a statistically significant decline in eelgrass shoot density underneath six of the 11studied floats in northern PS. Grating explained 22 percent of the variation in the relative amount of change in shoot density. Although results indicated that using grating (16 to 50 percent) did not avoid impacts to eelgrass, there may have been some beneficial effect from the use of grating. Within the grating range tested (16 to 50 percent), the authors did not find a relationship between the percentage of grating on the float and the change in eelgrass density. The authors hypothesize that there are likely other variables influencing eelgrass density and that there may be a threshold effect when it comes to light under the float; grating up to a certain amount would have had no effect, but losses would be reduced above this threshold value. The authors conclude with the recommendation that, “because of the high level of uncertainty associated with the effectiveness of changes in any one attribute, managers should take all possible steps to maximize the amount of submarine light to reduce risks to eelgrass” (Fresh et al. 2006).

The NMFS could not find studies examining the effect of OWS on SAV other than eelgrass and kelp (Mumford, 2007). However, the physiological pathways that result in the reduction in shoot density and biomass from shading applies to all SAV. Thus, it is reasonable to assume that shading from OWS adversely affects all SAV. A reduction to the primary production of SAV beds is likely to incrementally reduce the food sources and cover for PS Chinook salmon, HC summer-run chum, and steelhead. The reduction in food source includes epibenthos (Haas et al., 2002) as well as forage fish.

In addition to reduced SAV biomass and shoot density, shading also has been shown to be correlated with reduced density of the epibenthic assemblage under ferry terminals compared to a control site (Haas et al., 2002). With few exceptions (insignificant decrease for non-salmonid-prey taxa), the significant differences suggest adverse impacts for salmon from reduced epibenthos density under these ferry terminals. While the reduction in light and SAV were likely a cause for the reduction in epibenthos, changes in grain size due to boat action and current alteration also may have contributed (Haas et al., 2002). The results from Haas et al. (2002) likely apply to smaller structures as well because the same causal mechanisms occur. The likely incremental reduction in epibenthic prey associated with the projects proposed under RGP-6 will likely adversely affect the forage for PS Chinook and HC summer-run salmon.

Herring is another food source for listed PS Chinook and HC summer-run chum salmon. Thus, it is important to avoid, minimize, and offset all impacts of residential PRFs on the SAV that support herring spawning. Spawning areas for PS herring are largely limited to depth at which SAV will grow with herring using several species of macroalgae as spawning substrate. In shallower areas, *Zostera marina* is of primary importance, and in slightly deeper areas, *Gracilaria* spp. predominates (Penttila, 2007). An essential element of herring spawning habitat appears to be the presence of perennial marine vegetation beds at rather specific locations (Penttila, 2007). While across the PS region native eelgrass (*Zostera marina)* is of primary importance as spawning substrate, other SAV is used locally. In some parts of PS, algal turf, often formed by dozens of species of red, green and brown algae, is used by spawning herring (Millikan and Penttila, 1973). In deeper water and in areas where native eelgrass beds do not predominate, herring spawn on the mid-bottom-dwelling red alga *Gracilariopsis sp.* (referred to as *Gracilaria* in some sources) (Penttila, 2007). In Wollochet Bay WDFW documented spawning mainly on *Ulva sp*.

As we do not know specific locations of proposed PRFs, we have to assume that some adverse impacts to documented herring spawning substrate and epibenthic prey as a result of shading will result as part of the proposed action. All PRFs are likely to result in a reduction of epibenthic prey and most in some reduction of SAV. In addition, the PRFs in areas with herring spawning are likely to result in reduced numbers of herring. The likely incremental reduction in forage from the overall RPG 6 program will adversely affect PS Chinook, steelhead, and HC summer-run chum salmon. All salmon exposed to these changed conditions are likely to experience a reduction in their individual growth, fitness, survival, and abundance. In general, early marine juvenile growth is dependent on ample food supply and has been shown to be linked to overall salmonid survival and production (Beamish et al., 2004) (Tomaro et al., 2012). Early marine growth of chum salmon is linked to strong returns of chum 3 years later (Martinson, 2013) and rapid growth of PS Chinook salmon during the early marine period is critical for improved marine survival (Duffy and Beauchamp, 2011). In summary, the PBFs of early marine rearing will be negatively affected by the action through a relatively small reduction in forage and cover.

Removal of Riparian Vegetation

While the COE's RGP-6 permit requirements include meaningful avoidance, minimization, and mitigation measures to reduce removal of riparian vegetation, the proposed program will likely result in some measurable degradation of riparian PBFs. Impacts are likely to result from removal of vegetation for clearing of temporary work strips and permanent clearing of riparian areas for access, stairs, and trams. When on-site mitigation is proposed, the lack of proposed monitoring and resulting uncertainty of success make it likely that the program will result in a net loss of riparian PBFs. Assuming a 10-foot wide and 50-foot long area of impact for each project, the riparian impact over the 5-year duration of the program would amount to 78,500 square feet [50 sqft * (150 PRF + 25 stairs & trams)].

Riparian vegetation in PS has already been significantly degraded by timber harvest, urban development, roads, railroads, and other infrastructure and activities (Brennan, 2007). About 27 percent of PS is hardened and those shorelines have little native or woody vegetation behind the bulkhead. Although small on a project-by-project basis, the combined effect of the RGP-6 program will likely add further riparian habitat degradation.

Riparian vegetation provides many functions including allochtonous material to the food chain including insects that juvenile salmon feed on and shade for forage fish spawn (Penttilla, 2007). Terrestrial leaf litter feeds aquatic invertebrates (Romanuk and Levings, 2003) which in turn are a food source for Chinook salmon (Duffy et al., 2010). Further, terrestrial insects that drop into the nearshore marine waters directly feed Chinook salmon (Toft et al., 2007; Duffy et al., 2010). Next to insects and marine zooplankton, forage fish are an important part of Chinooks' diet (Duffy et al., 2010). Forage fish spawn in the upper shore zone where shade is important to keep their eggs from desiccation during the summer incubation period (Penttila, 2002; Rice, 2006).

On a program scale, for 150 PRFs and 25 marine rails, trams and stairs each, over 5 years, these reductions in PBFs of riparian habitat are likely to result in a small but measurable reduction in food supply that will last for at least 40 years, the existence of the structures. In times when food is limiting juvenile salmonid or rockfish growth, this will likely cause proportionally small reductions in individual fitness and survival.

Water Quality

Watercraft-related water quality impacts. Accidental releases of fuel, oil, and other contaminants, are reasonably likely to occur from watercraft use. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAHs), which can kill fish, invertebrates, and aquatic vegetation at high levels of exposure (Meador et al. 2006). We anticipate PAH releases will be intermittent, infrequent, and limited to very small quantities (ounces) and therefore effects to CH small scale, low level and intermittent. They would likely be limited to very small areas and amounts of reduced forage for juvenile salmonids and rockfish.

Mitigation

The proposed action incorporates a number of minimization measures to avoid, reduce, and minimize the adverse effects of the action on PBFs including forage and cover. These minimization measures include the minimization of OWS footprints, maximization of grating to pass light through the structure, spanning forage fish spawning habitat to the maximum extent reasonable (40 ft minimum pier span), and minimization of removal of riparian vegetation. These elements reduce, but do not eliminate, the extent of the project's negative effects on the environment. To offset the remaining negative habitat effects, the COE proposes mitigation measures as an integral part of RGP-6.

The COE worked with NMFS on developing a suite of mitigation measures to offset the habitat impacts. Mitigation measures include on-site and off-site options. On-site mitigation options include planting riparian vegetation, placing LMW in the intertidal zone, and removing shoreline armoring. Off-site options include mitigation banks and third party responsible mitigation.

On-site mitigation will follow all CMs established for the proposed installation of new structures, including timing windows and development of MMMPs for removal of old treated pilings[22]. Further, mitigation in the intertidal like placement of LWM and spawning gravel will be restricted to work windows to avoid exposure of listed species and forage fish and will be performed at low tides. This will minimize the likelihood that listed fish will be in the area affected by the mitigation work at the time the effects of that work occur; but even if a few fish are present, the effects of the work will be minimized by the CMs so that they are extremely minor, small-scale, and short-term. Potential negative effects from construction of off-site mitigation is assessed in separate consultations which are required for conservation banks and construction of other restoration actions that may be used for mitigation.

The COE also worked with NMFS on quantifying direct habitat impacts from PRFs, floating boat lifts, and riparian vegetation removal. Quantification of impacts and mitigation is based on the NHV model and HEA (Ehinger et al. 2015) and expressed as MPs[23]. A common currency like MPs is necessary as the HEA model quantifies habitat services taking into consideration the size of subject areas, habitat quality of the subject areas, the time it takes for habitat to be impacted or restored, and the time an impact or benefit will remain in place. This common currency allows for impact and mitigation to be at different locations and for impact and mitigation to address different nearshore functions. And overall, on an ESU-wide scale, we expect calculated habitat functions of the impacts and the mitigation to be equivalent.

For example, one of the effects of the proposed suite of actions is to reduce SAV abundance and cover. Submerged aquatic vegetation provides cover and autochtonous food production for salmonids. As proposed, the loss of cover and autochtonous food can be mitigated via

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[22] Usually old pilings are removed when new pile driving is proposed as it is not economically to mobilize a pile driver for removal of only a few pilings. A MMMP, if necessary, would be prepared for the entire pile driving and removal combined.

[23] The COE's proposed common currency, MPs is derived from the usually used Discounted Service Acre Years (DSAYs) by multiplying DSAYs times 100.

addressing different functions while in the end providing the same number of MPs quantified using HEA. For example, mitigation could include planting of riparian vegetation, which would improve production and availability of allochtonous food in the nearshore. However, food organisms would be different from those provided via autochtonous production. Cover is associated with riparian plantings, only, if shoreline armoring does not separate woody riparian vegetation from the nearshore. This fact is considered and quantified in the NHV model and subsequent MP calculations through HEA. Another mitigation option could be placement of forage fish spawning gravel in an area where forage fish have been documented to spawn and gravel is limited. Placement of spawning gravel would likely increase the success of forage fish spawning and thus, their productivity and abundance. This mitigation measure would increase intertidal food production for salmonids, albeit, through benefiting different forage species than those impacted via impacts to SAV. The habitat benefits of the third proposed mitigation option (Appendix I, Table 3), placement of LWM, include: a) providing cover to juvenile salmonids; b) locally stabilizing spawning gravels for forage fish, c) locally reducing beach lowering; and d) increasing food production on surfaces of LWM and in protected, smaller grained sediment. Fourth, removing treated pilings for mitigation improves water quality.

The mitigation options, planting riparian vegetation, placing spawning gravel, placing LWM, and removing treated pilings address the loss of food associated with the loss of SAV via enhancing different nearshore habitat function. While some of the mitigation options include enhancing food production other focus on totally different habitat functions, like water quality. This function trading, offsetting one limiting function, like the loss of forage through another, like improvements in water and sediment quality, is part of the HEA model. And through quantifying all habitat losses and gains, the overall proposed habitat impacts from the proposed structures, not including their indirect effects, is zero.

Planting riparian vegetation, placing spawning gravel, placing LWM, and removing pilings all are usually on-site mitigation measures. They usually are proposed at the location of the impact, the proposed new structure. Mitigation options in the proposed action also include off-site mitigation through conservation banks and third-party responsible mitigation. While some areas of PS have established mitigation banks (Blue Heron in north PS) and in-lieu fee programs (central PS), there is also the option of purchasing credits through not-for-profit organizations like the South PS Salmon Enhancement Group. All three options usually offer the benefit of addressing multiple habitat functions. In the PS nearshore, common large-scale projects often involve removal of dikes or shoreline armoring, planting of riparian and intertidal vegetation and thus improving food production and habitat access. Conservation banks, in-lieu fee sites, and stand-alone mitigation projects through not-for-profit organizations also provide the benefit of restoring larger habitat blocks usually to properly functioning conditions whereas on-site mitigation tends to improve marginal habitat.

Regardless of which mitigation option is implemented, HEA provides a high certainty in quantifying habitat impacts and necessary mitigation to offset the impacts including temporal delays between impacts and mitigation. Habitat Equivalency Analysis is a well-established method and the NHVs model underwent extensive testing over the last three years. However, the proposed mitigation does not consider impacts from indirect effects including boats and boat use. Further, the implementation of mitigation commonly has some uncertainty associated with it, especially the on-site, small scale, and applicant responsible mitigation (National Research Council, 2001). Wetland and conservation banks have a higher certainty of success than small-scale applicant-responsible mitigation, because they are reviewed by a team of scientists and their credit release is tied to creation of functional value. As a wide range of mitigation is proposed under RGP-6, including a suite of on-site and off-site measures, assigning certainty of mitigation success is difficult. Determining certainty of success if further complicated as the proposed monitoring program leaves uncertainty regarding the implementation of the provisions of RGP-6 design criteria, as an unspecified number of PRFs will be reviewed for compliance, "A percentage of all structures and compensatory mitigation sites authorized by this RGP will be inspected for compliance annually" (Proposed Action, SPIF). Thus, we conservatively anticipate that, in spite of the proposed mitigation, reduced habitat suitability for listed species related to the construction and 40-year existence of new PRFs, marine rails, trams, and stairs in PS will still occur. This reduction in habitat suitability is related to lack of mitigation for indirect effects and to mitigation failure or lack of implementation, especially for on-site and small scale mitigation.

However, overall, we expect proposed mitigation, on-site as well as off-site, to result in beneficial effects to salmonid nearshore habitat. The minimization measures together with the mandatory mitigation will likely substantially reduce the adverse impact on PS Chinook salmon, HC chum salmon, and rockfish critical habitat.

Summary of Effects to Salmonid Population Viability

We assess the importance of habitat effects in the action area to the ESUs/DPS' 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.

We expect a onetime, construction-related reduction of abundance to occur from cumulative effects of SEL from impact pile driving. Harm would mostly occur when cumulative SEL exceeds the harm threshold. However, some, likely very few juveniles may be hurt when cumulative SEL exceeds the behavioral threshold. Our maximum estimate is that (a) 1,972 juvenile (10 adult equivalents) PS Chinook, (b) few juvenile HC summer-run chum, (c) depending on timing and location of pile driving in HC, very few if any adult HC summer-run chum, (d) very few if any juvenile steelhead, (e) a maximum 896,000 listed rockfish larvae (two adult equivalents), (f) very few listed juvenile canary rockfish and bocaccio, and (g) no adult PS Chinook, steelhead, or rockfish will be injured by the cumulative effects of sound exposure levels over the 5-year life of the RGP-6 program. Harm to two adult equivalent rockfish would be in the range of 0.004 percent of combined listed adult rockfish abundance[24]. Harm to ten adult equivalent PS Chinook would be in the range of 0.03 percent of the overall run size[25].

In addition to these one-time construction-related effects, the placement of PRF, boatlifts, mooring buoys, boats, stairs, and trams has long-term effects on the marine nearshore environment. These long-term effects result in obstruction of fish movement, reduction in SAV density and food supply, disturbance from boating activity and noise, and reduction in food supply from riparian impacts. They will mostly apply to juvenile PS Chinook and HC summer-run chum salmon, which migrate or rear in the nearshore area. We have no information that any effects other than the reduction in food supply, would affect juvenile rockfish. These long-term habitat changes, which will persist for the 40-year duration the structures are in place, result in an incremental increase in stress, reduction in foraging success, alteration of migration patterns (forcing juveniles to leave the nearshore), and impairment of predator avoidance. Effects to individual fish will occur among an undetermined percentage of all future cohorts of all populations that use the action area.

While we cannot quantify these long-term structure-related effects, we believe them to be proportional to the relatively small size of affected habitat. The proposed 150 PRFs and associated boats and floating boat lifts would cover an estimated 73,500 square feet of nearshore habitat: (240 sqft/float + 250 sqft/boat and floating boat lift) * 150 floats+boats = 73,500. The OWC would affect an area of 351,000 square feet, including a 10-foot effect buffer around each combined float and boat/boat lift. These 351,000 square feet of effected area represent 0.002 percent of the nearshore, Table 6. The riparian impacts from a maximum of 25 stairs and trams each are even smaller. We believe the impact to juvenile PS Chinook, HC summer-run chum, and canary rockfish and bocaccio rockfish CH to be similarly small. When these long-term effects are combined with the construction effects of pile driving, we expect a long-term, but very small decrease in abundance among all populations of PS Chinook and Hood Canal and even smaller for PS steelhead.

Table 6: Percent of PS Nearshore covered by New PRF + Boats

	Sqare Feet (for 150 projects)	**Square Kilometers (% of Nearshore Habitat)**
OWC float (150 floats)	240 (36,000)	
OWC boat and floating boat lift	250	
float+boat&lift OWC (OWC for 150)	490 (73,500)	
10-foot buffer	1,360	
Total PRF Effect Area for one OWS	2,340	
Total Effect Area for 150 PRFs	351,000	0.033 (**0.002%)**
OWC PS Baseline		12.78 (0.628%)
PS Nearshore Area		2,035.80

We recognize and appreciate that the COE is requiring mitigation to accompany each structure, and that the design criteria are designed to minimize impacts. Both minimization and mitigation together likely will significantly reduce overall habitat impacts. However, the proposed

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[24] 53,710 combined total estimated adult abundance of listed rockfish (Tonnes et al., 2016).

[25] 38,969 sum of spawner abundances of 22 populations in PS (NOAA Salmon Population Summary, SPS Data Base)

mitigation does not consider impacts from indirect effects, boats and boat use, and the proposed monitoring program, lacking a committed percentage of compliance reviews, yields uncertainty around the assurance that all structures approved through this permit will conform to the minimization and mitigation requirements of the permit. Thus, we anticipate that a number of juveniles of each species will be injured or killed because of reduced habitat suitability for listed species, together with increased predation and impacts from sound exposure, resulting from the action. The proposal to authorize a maximum of 150 PRF plus associated boatlifts, mooring buoys, stairs, trams, and marine rails is likely to negatively influence the overall survival potential of individual juvenile salmonids and lead to decreases in their populations' abundance. We expect these decreases to be proportional to the relatively small amount of habitat adversely affected. Given the size of the impacts, these effects on abundance should be nominal.

Productivity. Each new structure will incrementally degrade nearshore habitat conditions. In response to these habitat changes, we expect changes in behavior of juvenile salmonids including reduced foraging success, changed migratory pathway due to the obstruction from OWS, and increased energy expenditure. All these effects, independently or in combination, are likely to lead to proportional decreases in individual fitness and survival. The long-term changes to the nearshore environment are expected to exert a sustained downward pressure on nearshore habitat function in the PS and, proportionally to the relatively small amount of nearshore habitat affected, reduce the rearing and foraging capacity of the action area. The habitat impacts from the proposed authorization of OWS and shoreline structures will likely contribute to the decreases in productivity of early marine life-history stages in PS Chinook salmon and PS steelhead already inherent to the baseline.

Spatial Structure. We do not expect the proposed project to affect the spatial structure of any of the six affected ESUs/DPS'. First, it is likely that the 150 new PRFs and associated boatlifts, boats, and mooring buoys will be distributed throughout PS and HC, albeit not evenly[26]. Second, salmonid populations spread across the nearshore and mix when they enter PS (Fresh et al., 2006). Thus, even with some clustering of PRFs at highly developed shorelines in South Central PS, like along Hale Passage, the 150 PRFs will likely not disproportionally affect any one population.

Diversity. Salmon have complex life histories and changes in the nearshore environment will have a greater effect on specific life history traits that make prolonged use of the nearshore. The proposed action will concentrate the effects on PS Chinook delta fry. After emergence, delta fry quickly migrate downstream through the estuary into the marine nearshore and pocket estuaries (Beamer, 2005). Over time, selective pressure on one component of a life-history strategy tends to eliminate that divergent element from the population, reducing diversity in successive generations and the ability of the population to adapt to new environmental changes (McElhany et al., 2000). The subset of juvenile salmonids that extensively utilize the nearshore, delta fry, are likely to be killed or injured at a higher rate than other life history forms which use the marine nearshore for a shorter amount of time. These delta fry that experience increased mortality from the proposed action will have their life history strategy selected against. This will likely result in a slight, proportional to the limited habitat alteration, decline in PS Chinook

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[26] Historically, looking at PRFs built over the last 15 years, PRFs in PS have been distributed throughout PS with slightly higher concentrations in central PS.

diversity by differentially affecting specific populations that encounter PRFs in greater frequency during their early marine life history. We are not aware of any effects that would result in a reduction in diversity to PS steelhead or HC summer-run chum.

2.5 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.

The action area, all waters of PS, is influenced by actions in the nearshore, along the shoreline, and also in tributary watersheds of which effects extend into the action area. Actions in the nearshore and along the shoreline of PS and HC likely include port and ferry terminal expansions, residential and commercial development, shoreline modifications, road and railroad construction and maintenance, and agricultural development. Changes in tributary watersheds that affect the action area include reductions in water quality, water quantity, and sediment transport. Actions in the tributary watersheds whose effects extend into the action area include operation of hydropower facilities, flow regulations, timber harvest, land conversions, disconnection of floodplain by maintaining flood-protection levees, effects of transportation infrastructure, and growth-related commercial and residential development. Some of these developments will occur without a Federal nexus, including commercial and residential construction and even shoreline stabilization if it occurs above the OHWM interpreted by the Seattle District COE as their line of federal jurisdiction under the CWA. However, activities that occur waterward of the OHWM require a Corps permit and future ESA consultation.

All these actions, in the nearshore as well as in tributary watersheds, will cause long-lasting environmental changes and will continue to harm ESA-listed species and their critical habitats. Especially relevant effects include the loss or degradation of nearshore habitats, pocket estuaries, estuarine rearing habitats, wetlands, floodplains, riparian areas, and water quality. We consider human population growth to be the main driver for most of the future negative effects on salmon and steelhead and their habitat.

The populations in the PS region has increased from about 1.29 million people in 1950 to about 3.84 million in 2014, is expected to reach 4.17 million by 2020, and nearly 5 million by 2040 (Puget Sound Regional Council, 2016[27]). Thus, future private and public development actions are very likely to continue in and around PS. As the human population continues to grow, demand for agricultural, commercial, and residential development and supporting public infrastructure is also likely to grow. We believe the majority of environmental effects related to future growth will be linked to these activities, in particular land clearing, associated land-use changes (i.e., from forest to impervious, lawn or pasture), increased impervious surface, and related contributions of contaminants to area waters. Land use changes and development of the built environment that are detrimental to salmonid habitats are likely to continue under existing regulations. Though the existing regulations could decrease potential adverse effects on salmon

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[27] http://www.psrc.org/data/forecasts/

habitat, as currently constructed and implemented, they still will allow substantial degradation to occur; also see above, section 2.3 “no change in Human Sound Behavior Index”. Over time, the incremental degradation, when added to the already degraded environmental baseline, will likely result in reduced habitat quality for at-risk salmon and steelhead.

In addition to these growth-related habitat changes, climate change has become an increasing driver for infrastructure development and changes to protect against sea level rise in coastal areas. These changes to nearshore habitat can include sea walls like the one currently being constructed in Venice (Mose) and considered for many major US cities including New York (Marshall, May 2014). Regardless of the environmental effects, the cost of flooding has been predicted to be higher than the cost of building such sea walls (Lehmann, February, 2014) which increases the likelihood of more flood protection projects coming to PS in the future. These flood protection projects will likely include, filling, raising of habitat, dikes, dunes, revetments, flood gates, pump stations, and sea walls; all habitat modifications that will be detrimental to salmon.

In June 2005, the Shared Strategy presented its recovery plan for PS Chinook salmon and the Hood Canal Coordinating Council presented its recovery plan for Hood Canal summer-run chum salmon to NOAA Fisheries who adopted and expanded the recovery plans to meet its obligations under the ESA. Together, the joint plans comprise the 2007 PS Chinook and Hood Canal summer-run chum Recovery Plan. Several not for profit organizations and state and Federal agencies are implementing recovery actions identified in these recovery plans. Notwithstanding the beneficial effects of ongoing habitat restoration actions, the cumulative effects associated with continued development are likely to have ongoing adverse effects on salmon and steelhead population abundance and productivity. Only improved low-impact development actions together with increased numbers of restoration actions, watershed planning, and recovery plan implementation would be able to address growth related impacts into the future. To the extent that non-Federal recovery actions are implemented and offset on-going development actions, adverse cumulative effects may be minimized, but will probably not be completely avoided.

2.6 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 2.4) to the environmental baseline (Section 2.3) 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) reduce the value of designated or proposed critical habitat for the conservation of the species.

The current status of each of the six affected ESUs/DPS’ is poor, which is the reason for their continued listing. Abundance across the PS Chinook 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. For HC summer-run chum, the overall trend in spawning abundance is generally stable (close to one) for the Hood Canal population (all natural spawners and natural-origin only spawners) and for the Strait of Juan de Fuca population (all natural spawners). However, productivity between 2005 and 2009 has been very low. Abundance of adult steelhead returning to nearly all PS rivers has fallen substantially since estimates began for many populations in the late 1970s and early 1980s. Listed rockfish abundances continue to decline with little to no signs of any effects of recent protective measures.

The critical status of the affected species is related to their degraded CH and poor baseline conditions and for rockfish in particular also to overharvesting. In general, baseline habitat conditions in the PS region have been degraded chiefly by human development. Relevant habitat modifications include the channelization and diking of rivers, increase of impervious surfaces in most watersheds, simplification of river deltas, elimination of small coastal bays, reduction in sediment supply due to beach armoring, and loss of tidal wetland (Fresh et al., 2011). In addition to beach armoring, other shoreline changes including OWS, marinas, roads, and railroads reduce marine nearshore habitat quality (Simenstad et al., 2011). The extent of these habitat changes significantly impairs several aspects of critical habitat and puts its function for listed salmonids at risk.

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 CH or influence CH for listed species.

The likely effects of the action on PS Chinook salmon, HC summer-run chum, and rockfish CH include long-term effects on forage, natural cover, and safe passage. Critical habitat for PS steelhead has no marine component and thus is not affected. The persistence of in-water structures are reasonably likely to burden the function of the physical and biological features of habitat in the action area for 40 years (the expected life of a PRF). While locally measurable as, for example, reductions in SAV, the effect of the proposed action on the nearshore component of CH on and ESU/DPS-wide scale is small. Overall, we believe the effects on CH to be proportional to the relatively small size of affected habitat. The proposed 150 PRFs including associated boats, boat lifts, and a 10-foot impact buffer would affect an estimated 351,000 square feet of nearshore habitat which amounts to an impact of an additional 0.002 percent of the nearshore. Impacts from stairs and trams would be smaller.

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 an ESU/DPS-level to substantially 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.

The effect of the action on listed salmonids and Puget Sound/Georgia Basin DPS of yelloweye rockfish, canary rockfish and bocaccio includes short-term construction-related effects and long-term effects resulting from the habitat modifications. We expect a onetime, construction-related reduction of abundance to occur from aggregate effects of SEL from impact pile driving. We estimate that over the 5-year life of the RGP-6 program an extremely low number of fish from each listed ESU/DPS will be injured by the cumulative effects of sound exposure levels. In addition to these one-time construction-related effects, the placement of PRF, boatlifts, mooring buoys, boats, stairs, and trams has long-term effects on the marine nearshore environment. These long-term effects result in obstruction of fish movement, reduction in SAV density and food supply, disturbance from boating activity and noise, and reduction in food supply from riparian impacts. They will persist for the 40-year duration the structures are in place. Effects to individual fish from these habitat modifications include harm and reduction in individual fitness from an incremental increase in stress (boating noise), reduction in foraging success (reduced SAV, shading, reduced riparian vegetation), alteration of migration patterns (forcing juveniles to leave the nearshore), and impairment of predator avoidance (shading). While we cannot quantify these long-term structure-related effects on abundance and productivity of listed fish, we believe them to be proportional to the relatively small proportion of affected habitat; 0.002 percent of available nearshore habitat.

The above summarized impacts on ESU/DPS abundance from the proposed construction and habitat modification associated with the PRFs, boats, and shoreline structures will likely lead to a small continued downward pressure on habitat function and result in an incremental decreases in productivity. Further, as the effects occur in the PS nearshore, PS Chinook delta fry, who use the nearshore longer than any other life history, type will be effected more than other PS life history types. Thus, we expect that delta fry are likely to be killed or injured at a higher rate than other life history. These delta fry that experience increased mortality from the proposed action will have their life history strategy selected against. This will likely result in a slight, proportional to the limited habitat alteration, decline in PS Chinook diversity.

While cumulative SEL from pile driving and the long-term habitat alterations are anticipated to lead to decreased survival and fitness and will slightly reduce abundance, productivity and diversity (for PS Chinook, only), we expect, on an ESU/DPS-level, the magnitude of this increased mortality to be proportional to the amount of habitat affected, hence, very small. Thus, the effects of the proposed action on the affected ESUs/DPS’, even when added to the poor status of the species, degraded baseline, and cumulative effects, are not expected to significantly impact the status of any population or listed ESU/DPS.

2.7 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, HC summer-run chum salmon, PS steelhead, Puget Sound/Georgia Basin DPS of yelloweye rockfish, Puget Sound/Georgia Basin DPS of canary rockfish, Puget Sound/Georgia Basin DPS of bocaccio rockfish or destroy or adversely modify their designated critical habitat.

2.8 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 incidental take statement.

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows:

Table7: Take Summary

Species	**Lifestage**	**Type of Take**	**Description of take mechanism**	**Maximum numbers affected or Area affected[28]**
PS Chinook	juveniles	harm	Exposure to cumulative SEL above harm threshold.	1,972 juveniles (10 adult equivalents) annually
	juveniles	harm	Exposure to cumulative SEL above behavioral threshold.	Juveniles along 4,140 feet of shoreline where cumulative SEL above behavioral threshold is likely for 3 days of pile driving for each project.
	juveniles	harm	Harm through long-term habitat modification that reduces fitness and survival.	351,000 square feet of nearshore habitat will be degraded by OWS for the 40 year expected life of the structures.

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[28] PS salmonid abundances are usually measured per year class, thus we give impacts on annual abundance. As rockfish are a long-living species, their abundance is measured as standing stock and we express the impact over the total duration of the permit.

				78,500 square feet of riparian habitat will be degraded for access and permanent structure placement [50 sqft * (150 PRF + 25 stairs & trams)].
HC summer-run chum	juveniles	harm	Exposure to cumulative SEL above harm threshold.	Juveniles along a total of 7,380 feet off shoreline (10 projects in HC times 738 feet of shoreline per project where cumulative SEL above harm threshold is likely) for 3 days of pile driving.[29]
	adults	harm	Exposure to cumulative SEL above harm threshold.	Adult within a total of 117 hectares (10 projects in HC times 1.17 hectares per project where cumulative SEL above harm threshold is likely) for 3 days of pile driving[30].
	juveniles	harm	Exposure to cumulative SEL above behavioral threshold.	Juveniles along 4,140 feet of shoreline where cumulative SEL above behavioral threshold is likely for 3 days of pile driving for each project.
	juveniles	harm	Harm through long-term habitat modification that reduces fitness and survival.	351,000 square feet of nearshore habitat will be degraded by OWS for the 40 year expected life of the structures. 78,500 square feet of riparian will be degraded for access and permanent structure placement [50 sqft * (150 PRF + 25 stairs & trams)].
PS steelhead	juveniles	harm	Exposure to cumulative SEL above harm threshold.	Juveniles within 35 hectares of nearshore (30 projects times 1.17 hectares per project where cumulative SEL above harm threshold is likely) for 3 days of pile driving.
	Juveniles	harm	Exposure to cumulative SEL above behavioral threshold.	Juveniles within 1,875 hectares (30 projects times 62.5 hectares per project where cumulative SEL above behavioral threshold is likely) for 3 days of pile driving per project.
	juveniles	harm	Harm through long-term habitat modification that reduces individual fitness and survival through reduced food supply.	351,000 square feet of nearshore habitat will be degraded by OWS for the 40 year expected life of the structures. 78,500 square feet of riparian will be degraded for access and permanent structure placement [50 sqft * (150 PRF + 25 stairs & trams)].
PS/ Georgia Basin DPS listed rockfish	larvae	harm	Exposure to cumulative SEL above harm threshold.	896,000 larvae (two adult equivalents) over the 5-year length of the proposed permit.
PS/ Georgia Basin DPS canary rockfish and	juveniles	harm	Exposure to cumulative SEL above harm threshold.	Juveniles within 175 hectares of nearshore (150 projects times 1.17 hectares per project where cumulative

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[29] This is assuming a worst case scenario of construction of 10 projects in February in HC every year.

[30] This is assuming a worst case scenario of construction of 10 projects in late summer within 2 miles of HC natal estuaries every year.

bocaccio rockfish				SEL above harm threshold is likely) for 3 days of pile driving[31].
	juveniles	harm	Exposure to cumulative SEL above behavioral threshold.	Juveniles within 1,875 hectares (30 projects times 62.5 hectares per project where cumulative SEL above behavioral threshold is likely) for 3 days of pile driving per project.
	juveniles	harm	Harm through long-term habitat modification that reduces individual fitness and survival through reduced food supply.	351,000 square feet of nearshore habitat will be degraded by OWS for the 40 year expected life of the structures. 78,500 square feet of riparian will be degraded for access and permanent structure placement [50 sqft * (150 PRF + 25 stairs & trams)].

For the jeopardy analysis, we conservatively estimated, where possible, the maximum number of fish for each listed ESU/DPS that would likely experience death, injury, or significant behavior modification. However, while we provided a maximum estimate for the purpose of making our jeopardy determination, it is not feasible to actually count or track the number of juvenile salmonids that will be harmed by construction-related effects or long-term effects resulting from the habitat modifications. This is because the adverse effects of the proposed action will occur at various locations over the course of 5 years. The distribution of listed fish in those areas varies depending on many factors. There is no way to determine exactly how many fish would be present when construction-related effects would occur. We cannot count how many fish will be harmed by SEL. Likewise, we cannot determine how many fish will be harmed by the long-term effects resulting from habitat modification caused by permitting the PRFs. For instance, we cannot determine how many fish will be killed by predators when swimming around or under the OWS, nor the juveniles that will be harmed by reduced forage.

Thus, for the take caused by SEL, we used the total number of pilings proposed to be permitted for installation over 5 years as a habitat surrogate: 3,000 pilings[32]. If 3,000 pilings have been installed prior to the end of 5 years, installation of any additional pilings will require reinitiation. For take resulting from habitat modifications, we will use the area of OWC from floats and riparian habitat affected as a habitat surrogate: OWC from floats 36,000 square feet; riparian habitat 78,500 square feet. These surrogates are proportional to the amount of take considered to result from the action, as summarized in Table 7, and is equivalent to the maximum amount of take considered in our jeopardy analysis. Therefore, if the surrogate is exceeded, reinitiation of consultation will be required. This surrogate will function as an effective reinitiation trigger because, different from the actual number of salmon predated, the area of overwater structure, number of pilings, and area of riparian vegetation can be measured.

2.8.2 Effect of the Take

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[31] This is assuming a worst case scenario of constructing all OWS in rocky areas that juvenile rockfish favor.

[32] 20 pilings per PRF * 150 PRF over 5 years = 3,000 pilings

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.

2.8.3 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).

To minimize the impact of incidental take of listed salmon, steelhead, and rockfish species from the proposed action (50 CFR 402.14(i)(3)), the COE must:

1. Minimize incidental take from project related impact pile driving.
2. Minimize incidental take resulting from habitat modification by implementing an on-the-ground monitoring program to ensure compliance with the CMs and T&Cs.
3. Minimize incidental take by following administration and adaptive management measures.
4. Prepare and provide NMFS with annual monitoring reports tracking and monitoring the permitting program to ensure that the minimization measures are implemented and incidental take surrogates are not exceeded.

2.8.4 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 reasonable and prudent measures (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 incidental take statement (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following term and condition implements reasonable and prudent measure 1:
    a. As a measure to reduce the risk of injury and mortality to listed summer-run chum salmon adults staging in marine waters prior to freshwater entry and spawning, impact pile driving will not be allowed during the months of August and September in those portions of Hood Canal within a one mile radius of the mouths of the following streams/rivers: Big Quilcene, Little Quilcene, Dosewallips, Duckabush, Hamma Hamma, Lilliwaup, Skokomish, Union, Tahuya, Dewatto, Anderson, and Big Beef.
    b. As a measure to reduce the risk of injury and mortality to listed summer-run chum salmon early juvenile outmigrants, impact pile driving will not be allowed in HC between February 2 and July16.
    c. The Corps shall require the use of sound attenuation measures if an impact hammer (e.g., drop, hydraulic, diesel, or sledge hammer) is used to drive or proof steel pilings. The following sound attenuation methods shall be employed:

    a. Placement of a 6-inch-thick piece of wood or similar material between the hammer and pile.
    b. Use of a bubble curtain that distributes air bubbles around 100% of the perimeter of the piles over the full depth of the water column.

2. The following term and condition implements reasonable and prudent measure 2:
    a. To ensure projects and on-site mitigation are built as proposed, the COE will randomly site inspect a minimum of 5 percent of the projects authorized annually under the program including on-site mitigation. The COE may also conduct additional, complaint-driven inspections.
    b. The COE will inform NMFS of the results of its inspections.
    c. The COE will inspect and report to NMFS:
        i. Dimensions and area of pier
        ii. Percent of pier grating
        iii. Dimensions and area of float
        iv. Percent of float grating
        v. Check if grating is unobstructed (no tubs under grating)
        vi. Number of pilings
        vii. Material of pilings
        viii. Presence/absence of boats and dimensions
        ix. Presence/absence of floating boat lift and dimensions
        x. Presence/absence of mooring buoy.
        xi. Amount of riparian vegetation removed
        xii. Compliance of any on-site mitigation with applicant proposed mitigation plan.

3. The following term and condition implements reasonable and prudent measure 3:
    a. **Corps review.** The Corps will individually review and approve each action to ensure that (a) it meets all applicable design criteria, (b) habitat impacts are offset as proposed by use of the mitigation table (Appendix A); (c) the action will not be permitted to occur in any of the three excluded areas under this permit, Appendix A.
    b. **NMFS review.** The COE will ensure that all actions are consistent with the NMFS Opinion before issuing a permit. NMFS will provide technical assistance to the COE by individually reviewing and approving proposed permit actions as consistent with this opinion before the action is authorized. The Corps will initiate NMFS' review by electronically submitting the SPIF form (Appendix A) to NMFS' electronic mailbox, **RGP-6.WCR@noaa.gov**, with sufficient detail about the action design and construction to ensure the proposed action is consistent with all provisions of this opinion. NMFS will electronically notify the COE within 30 calendar days if the action is approved/confirmed or not. NMFS will also notify the COE if more review time is needed.
    c. After 2 years, when NMFS staff and COE managers are familiar with implementing the RGP-6 program, so that NMFS review does not add further value, both agencies can agree together to switch to periodic notification system under which the COE simply notifies NMFS at the end of the agreed upon time

   period with electronic submission of all SPIFs for which permits were issued in addition to the year-end reporting requirements, see T&C 4.
   d. **Site access.** The Corps will retain the right of reasonable access to the site of actions authorized under this opinion to monitor the use and effectiveness of permit conditions, see T&C 2.

4. The following term and condition implements reasonable and prudent measure 4:
   a. The COE shall require applicants to report the number of pilings driven for each project. The COE shall track and monitor that the pile-driving take surrogate of a maximum of 3,000 pilings driven over 5 years will not be exceeded.
   b. The COE shall require applicants to report the float area for each project. The COE shall track and monitor that the OWC take surrogate of 36,000 square feet over 5 years is not exceeded.
   c. The COE shall require applicants to report the size of the area where riparian vegetation has been removed for each project. The COE shall track and monitor that the take surrogate of 78,500 square feet of riparian vegetation removal over 5 years is not exceeded.
   d. The Corps' Regulatory Branch shall submit an annual report to NMFS by April 15 of the subsequent calendar year that tracks and monitors the Corps' implementation of the RGP-6 program under the terms of this opinion, and includes the following information in Excel spreadsheet format[33] (4.a-c included):
      i. Location of projects by sub-basin (Strait of Juan de Fuca, San Juan Islands/Strait of Georgia, Hood Canal, Whidbey, North Central Puget Sound, South Central Puget Sound, South Puget Sound). And cumulatively for the PS and for each sub-basin detail:
         1. Dimensions and area of pier
            a. Percent of pier grating
            b. Percent of open space of grating
         2. Dimensions and area of float
            a. Percent of float grating
            b. Percent of open space of grating
         3. Whether eelgrass or kelp was present within 25 feet of float
         4. Number and diameter of pilings
         5. Material of pilings
         6. Method of pile driving
         7. Whether a MMMP was implemented
         8. Number and dimensions of boats
         9. Number and dimensions of floating boat lift
         10. Presence/absence of mooring buoy.
         11. Amount of riparian vegetation removed
         12. Mitigation implemented:
            a. Number of MPs

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[33] Making this information available in an Excel spreadsheet format will allow both our agencies to utilize this information for future consultations including the next RGP-6.

   b. Location of mitigation or provider of third-party responsible mitigation.
   c. Receipt for purchase of mitigation/conservation credits.
   d. Type(s) of mitigation (SPIF Table 3)

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. The construction of PRFs in PS will not cease at the end of the proposed RGP-6 captured by this 5-year permit. To address impacts from the ongoing construction of OWS more realistically, the COE should submit the next consultation request for RGP-6 for a longer duration.

2. Boats which are usually associated with PRF, boatlifts, and mooring buoys permitted under RGP-6 cause habitat impacts as outlined above. The COE should include boats in their calculation of required mitigation.

3. Mitigation has a variable, but certain failure rate. To fully offset habitat impacts, increase the proposed mitigation by a likely 10 percent to cover the estimated non-compliance with and failure of mitigation. Adjust this rate as monitoring data on success of mitigation become available.

4. Exclude use of treated wood for decking.

5. Exclude use of treated wood for in-water and over-water use in pocket estuaries and locations with heavy human use patterns where synergistic effects (noise disturbance, WQ degradation from boats) are likely: Wollochet Bay, Horsehead Bay, Gig Harbor.

2.10 Reinitiation of Consultation

This concludes formal consultation for RGP-6.

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 incidental take statement 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 to 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.

2.11 “Not Likely to Adversely Affect” Determinations

2.11.1 Puget Sound/Georgia Basin DPS of Yelloweye Rockfish Critical Habitat

Critical habitat for yelloweye rockfish includes deepwater marine habitat, only. Deepwater marine habitat includes waters deeper than 30 meters which is the approximate extent of the photic zone in PS. No nearshore component was included in the CH listing for juvenile yelloweye rockfish as they, different from bocaccio and canary rockfish, typically are not found in shallow intertidal waters (Love et al., 1991). Yelloweye rockfish are most frequently observed in waters deeper than 30 meters (98 ft) near the upper depth range of adults (Yamanaka et al., 2006).

NMFS does not anticipate the proposed action will adversely affect yelloweye rockfish CH as effects from the proposed action are mostly limited to nearshore areas, shallower than 30 meters. Usually all residential PRFs will be placed in water shallower than 30 meters. Thus, direct effects from the proposed structures are restricted to areas landward of listed yelloweye CH. Indirect effects associated with boating will extend into deepwater marine CH. However, effects from boating noise are limited to effects to species, see section 2.4.1. Further, the proposed action will have insignificant effects on water quality, see section 2.4.2.

2.11.2 Southern Resident Killer Whales

The final rule listing Southern Resident (SR) 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).

NMFS does not anticipate the proposed action will take SRKW as the proposed action does not directly harm SR Killer Wales or significantly affect any limiting factors. Similarly, we do not expect harm from the proposed action to SRKW critical habitat, which is not designated in waters shallower than 20 feet (6.1 m) at extreme high tide, the depth profile where the vast majority of PRFs are expected to be built. In the event that a PRF is built in waters that would be considered to overlap with SRKW critical habitat, we are reasonably certain, given the transient nature of the SRKW and the extremely limited time they would encounter a PRF, that SRKW critical habitat PBFs would not be compromised in its functional capacity for the species, given the maximum projected OWS coverage anticipated in this opinion. The proposed 150 PRFs--including associated boats; boat lifts; and a 10-foot impact buffer would affect an estimated 351,000 square feet of nearshore habitat in the PS which amounts to an impact of an additional 0.002 percent of the nearshore over the baseline. Impacts from stairs and trams would be smaller. As we anticipate that only a fraction of this estimate of OWS would project into depths recognized as SRKW habitat, and given that SRKW critical habitat extends well outside of PS, the likelihood of adversely affecting SRKW critical habitat is extremely unlikely, and therefore discountable.

The proposed action includes sufficient CMs to avoid exposure of SRKW to potential sound effects from vibratory pile driving: “If SR Killer whales have been documented more than four times during the proposed work window in the quadrant the project area is located in, a MMMP must be prepared and submitted with this application. This information will be reviewed by a NMFS biologist." The objective of a MMMP is to observe for marine mammals within the area of potential sound effect and stop or not start work while a marine mammal is within the area of potential sound effect. Thus, any direct harm from construction effects is extremely unlikely and thus discountable.

Further, the proposed action will have insignificant effects on water quality, see section 2.4.1. Thus, we expect any effects on the contaminant levels in SR Killer Whale prey to also be insignificant. Finally, the maximum likely prey reduction is extremely small. The abundance of PS Chinook salmon, the preferred SR Killer Whale prey, would likely be reduced by:

- A onetime, construction-related reduction from cumulative effects of SEL from impact pile driving. Our estimate is that over the 5-year duration of the permit a maximum of 1,972 juvenile (10 adult equivalents[34]) PS Chinook could be harmed.
- Further, harm to mainly juvenile Chinook will likely result from long-term effects of the structures on the marine nearshore environment. These long-term effects to shallow water habitat include the obstruction of fish movement, reduction in SAV density and food supply, and disturbance from boating activity and noise. While we cannot quantify the maximum number of juveniles that likely would be harmed, we believe their number to be extremely small and in range with the 0.00151 percent of additional nearshore habitat that likely will be covered up by PRFs and associated boats. For more detail see section 2.4.2.

Thus, any salmonid take would likely result in an insignificant reduction in prey resources for SR killer whales. Therefore, NMFS finds that the proposed action may affect, but is not likely to adversely affect SR killer whales.

2.11.3 Humpback Whales

Humpback whales are baleen whales, filtering their food through the baleen from the water. They feed on tiny crustaceans (mostly krill), plankton, and small fish and can consume up to 3,000 pounds (1,360 kg) of food per day. NMFS published a proposed rule to identify 14 DPSs of humpback whales and list two as threatened and two as endangered (80 FR 22304; April 21, 2015). However, this proposed rule has not been finalized yet and humpback whales are at this point in time listed as an endangered global population. Factors which may be limiting humpback whale recovery include entanglement in fishing gear, collisions with ships, whale watching harassment, subsistence hunting, and anthropogenic sound (NMFS 1991).

Since 2000, humpback whales have been sighted with increasing frequency in the inside waters of Washington (Falcone et. al. 2005). In 2014 and 2015 sightings sharply increased to around 500 each year (Orca Network). Potential effects from the proposed action include sound disturbance from pile driving. While humpback sightings in PS occur during the proposed work window, the likelihood for exposure to vibratory pile driving is discountable because of the proposed CMs. The COE proposes that applicants will have to submit a MMMP if in one or both of the previous two years there were four or more humpback whale sightings during

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[34] Adult equivalents is calculated by multiplying the juveniles times the smolt to adult return rates (SAR) for salmon. We used an average SAR of 0.48% for PS Chinook derived from eight individual SARs provided by PS hatcheries, http://wdfw.wa.gov/hatcheries/hgmp/2012_puget_sound.html

the month in which pile driving will occur in the basin where pile driving will occur. Each MMMP will be subject to NMFS review. The objective of a MMMP is to observe for marine mammals within the area of potential sound effect and stop or not start work while a marine mammal is within the area of potential sound effect.

After completing a comprehensive status review, on April 21, 2015, we proposed to reclassify humpback whales as 14 DPSs rather than a single listed species (80 FR 22304). We proposed to list 2 DPSs as threatened and 2 DPSs as endangered. We proposed the other 10 DPSs as not warranted for listing. NMFS cannot, at this time, quantify how many humpback whales from the different proposed DPSs may be affected by the proposed action. Above, we conclude that all of the effects of the proposed action will be discountable. This conclusion is made at the level of an individual whale. Since none of the effects of the proposed action will be meaningful to individual animals, the proposed action will result in no population-level impacts to humpback whales. Therefore, our conclusion for the current single listed species would be the same for any of the proposed DPSs and we do not foresee the need to reinitiate this consultation when we finalize our rule to reclassify humpback whales.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. 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 (PFMC 2005), coastal pelagic species (PFMC 1998), Pacific coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Puget Sound is a Habitat Area of Particular Concern (HAPC), based on importance of the ecological function provided by the habitat. The environmental effects of the proposed project may adversely affect a maximum of 351,000 square feet (8.1 acres) of EFH for Pacific coast groundfish, coastal pelagic species, and Pacific coast salmon in the HAPC for these species. These 8.1 acres of nearshore habitat will be impacted by shading form OWS and associated reduction in SAV density, prey abundance, and productivity. The proposed mitigation will offset some of the habitat impacts to EFH for these species.

3.2 Adverse Effects on Essential Fish Habitat

The effects of the proposed project on salmon and rockfish are described in section 2.4., above. The same mechanisms of effect are likely to affect all Pacific coast groundfish, coastal pelagic species, and Pacific coast salmon to varying degrees. These adverse effects include:

1. Shading of SAV and resulting reduction in SAV density and abundance and related primary production from OWS including floats, boats, and floating boat lifts.
2. Reduction in quality of nearshore habitat through disturbance associated with OWS and boat use.
3. Reduction in quality of nearshore habitat through removal of riparian vegetation and resulting reduction of allochtonous input to the nearshore.
4. Reduction in available nearshore habitat through installation of a maximum of 3,000 pilings.

3.3 Essential Fish Habitat Conservation Recommendations

Fully implementing these EFH CRs would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, approximately 8.1 acres of designated EFH for Pacific coast salmon and Pacific coast groundfish.

1. Reduce overall shading from OWS by permitting only structures that meet the suggested maximum dimensions for OWS.
2. The COE already designed a mitigation program that will partially offset effects to EFH. The following measures will improve this program and fully address adverse effects 1-4:
    a. To ensure compliance with the T&Cs[35] of the proposed action follow T&C 2 of this opinion: Randomly site inspect a minimum of 5 percent of the projects authorized annually under the program. Track and monitor and report back to NMFS all parameters listed under 2.8.4. 2.c.
    b. Include the effects from boats in the mitigation calculations.
    c. Increase the proposed mitigation by 10 percent of estimated non-compliance with and/or failure of mitigation. Adjust this rate as monitoring data on success of mitigation become available.

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 CRs unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a

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[35] The proposed action includes conservation measures that the COE terms T&Cs. These "proposed T&Cs" are different from the T&Cs that we provide under section 2.8.4.

description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the CRs, 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 CRs 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 CRs 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 CRs (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 US. Army Corps of Engineers. Other interested users could include: pier-ramp and float applicants and their agents, affected tribes, industry, municipalities and county jurisdictions, recreational boaters and fishers. 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 implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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7. APPENDIX I: SPIF for RGP-6

US Army Corps
of Engineers
Seattle District

Department of the Army
Regional General Permit

Structures in Inland Marine Waters of Washington State

Permit Title: Regional General Permit 6 (RGP-6): Structures in Inland Marine Waters of Washington State

Effective Date: [to be determined] **Expiration Date:** [to be determined]

Authority: In accordance with 33 CFR 325.2(e)(2), the U.S. Army Corps of Engineers (Corps) is proposing this modification and reissuance of Regional General Permit 6 (RGP-6) to authorize certain activities in or affecting waters of the United States, including navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.

Issuing Office: U.S. Army Corps of Engineers, Seattle District
Regulatory Branch
Post Office Box 3755
Seattle, Washington 98124-3755
Telephone: (206) 764-3495
Website: www.nws.usace.army.mil/

Purpose: The purpose of RGP-6 is to authorize the construction of new[36] residential overwater structures in inland marine waters of Washington State through a streamlined permitting process that includes a programmatic Section 7 Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation and Management Act (MSA) essential fish habitat (EFH) consultation, provided the reviewing biologists determine impacts to the aquatic environment have been avoided, minimized and mitigated.

Activities Authorized by RGP-6: Work authorized by RGP-6 is limited to the following categories of activities: the installation and construction of new residential overwater structures in inland marine waters of Washington State. These structures include piers, ramps, floats, mooring buoys, marine rails, open-frame stairways, bluff-to-beach trams, and watercraft lifts. Applicants are limited to one overwater structure or marine railway plus one stairway or tram per property. Construction of marinas, dolphins or commercial structures are not authorized by this RGP. Shared or "joint-use" overwater structures are encouraged because they result in fewer overwater structures (they may also be more cost-effective for applicants). For the purpose of this RGP, "joint-use" means overwater structures constructed and shared by more than one residential waterfront property owner or by a homeowners' association that owns waterfront property. The placement of fill material proposed as compensatory mitigation (for example, the placement of spawning gravel) may also be authorized by this RGP.

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[36] For the purposes of RGP-6, "new" structures means those placed where there was previously none; this includes modifications to existing structures that expand the footprint (For example, if an existing pier is proposed to be extended 10 feet, the proposed 10 feet must meet all applicable Terms and Conditions of RGP-6 to be authorized by RGP-6).

Avoidance, Minimization and Compensatory Mitigation: Compensatory mitigation will be required as part of the proposed action to reduce cumulative and individual impacts to the aquatic environment including ESA-listed species and habitat (see Appendix B). The amount of mitigation will be calculated only after it has been demonstrated that impacts have been avoided and minimized. An example of avoidance is situating a pier as far as possible from eelgrass an example of a minimization measure is fully grating an overwater structure.

Location of Authorized Activities: For the purposes of this RGP, inland marine waters are defined as tidally influenced waters within the state of Washington limited to the marine waters ranging from South Puget Sound and Hood Canal to and including the Strait of Juan de Fuca and the Strait of Georgia. This does not include the outer coast adjoining the Pacific Ocean or tidally influenced rivers (above river mile "zero") draining into these waters.

RGP-6 is applicable to inland marine waters of the state of Washington with the following exceptions:

- Elliott Bay at Seattle. Elliott Bay extends from the tip of West Point in Discovery Park south to the tip of Alki Point in West Seattle.
- Sites in or within 300 feet of an existing or previously designated Superfund Site (http://www.epa.gov/superfund) or the Washington State Model Toxic Control Act (https://fortress.wa.gov/ecy/publications/publications/ftc94129.pdf) cleanup site.

Use of this RGP: To use RGP-6, a prospective permittee must apply to the Corps in accordance with the procedures herein. **Submittal of a complete application constitutes the applicant's voluntary agreement to meet all of the terms and conditions of this RGP.** A proposed project is not authorized under this RGP, and work may not commence, until the Seattle District Engineer (DE) or their designee (i.e., Regulatory Project Manager) has issued written verification that the proposed project is authorized. The permittee is responsible for ensuring the authorized structures and construction activities comply with all terms and conditions of this RGP, including any project-specific special conditions that may be added by the DE. Failure to abide by the requirements of RGP-6 may constitute a violation of the Clean Water Act, Rivers and Harbors Act, MSA, National Historic Preservation Act, ESA and other relevant laws. For purposes of this RGP, the term "permittee" shall include all successors in interest.

Once the work is authorized by this RGP, a Department of the Army Individual, Nationwide, or different regional permit must approve any proposed maintenance beyond the limitations of the authorization. Projects that don't meet the requirements of RGP-6 are subject to a different permitting process as well as individual ESA and MSA consultation.

Compliance: A percentage of all structures and compensatory mitigation sites authorized by this RGP will be inspected for compliance annually.

Application Procedures: In order to apply for RGP-6 authorization, applicants must submit a single set of hard copies as well as a CD containing all electronic files of the documents, to the address on page one of this RGP:

1. **Application:** Completed and signed *Regional General Permit 6 (RGP-6) Application Form* located in Appendix A. You do not need to submit a Joint Aquatic Resources Permit Application (JARPA). However, if you have already completed a JARPA for State or local permits, you may submit a copy to supplement the RGP-6 application.

2. **Mitigation:** *Mitigation Requirements and Calculations Form* located in Appendix B.

3. **Project and Mitigation Drawings:** All existing and proposed conditions must be depicted (include manmade and landscape features). Drawings should be on 8 ½- by 11-inch paper. Include a north arrow, graphic scale, high tide line (mean higher high tide), mean high tide, and limits of upper, lower and deeper shore zones. Page 1 should be a vicinity map, Page 2 should show a top-down plan view, Page 3 should show a cross-sectional view and additional pages can be used if needed. Every page should have a Title Block.

REFERENCE: *(USACE will provide)*	LOCATION: _________________	PROPOSED PROJECT:
	(address/intersection/ parcel number)	*(short description)*
APPLICANT: _________________		
	LAT/LONG: ___________	IN: *(waterbody)*
ADJACENT PROPERTY OWNERS:		NEAR/AT: *(closest city or town)*
1. *(include name/parcel on plan view)*		COUNTY: *(county)*
2. *(include name/parcel on plan view)*	PAGE # OF # DATE: *(last revised)*	STATE: WA

4. **Joint-use Projects (only provide for joint-use) the following information must be provided:**

   a. List all property owners who would share in using the overwater structure as co-applicants; all must sign the *Application Form* in Appendix A.

   b. Provide a *Joint-Use Agreement* signed by all involved property owners; this Agreement must state that each property owner voluntarily agrees to build no other overwater structures on their property except for maintenance or modification of the authorized structure.

   c. Upon issuance of the permit, all property owners must record the Agreement on their property deeds/titles (See General Condition 3).

   d. Show on a drawing the location of all properties involved in the joint-use agreement, with addresses.

5. For activities that may affect historic properties, listed or eligible for listing, in the National Register of Historic Places, the application must include a description of each historic property that may be affected by the proposed work and a map indicating the location of the property. The Corps will review each project individually under Section 106 of the NHPA and federally recognized Native American Tribes with an interest in the project area will be notified of each project so they can perform their own review for cultural resources.

6. Basic information required to assess existing conditions:

   a. **Forage Fish.** *Forage fish provide a critical food web link in marine waters.* Photographs should be taken of the project area, bank and beach. Photographs should be taken at low tide and be zoomed in enough to show the substrate composition of the upper shore zone. A forage fish (surf smelt, Pacific herring, sand lance) habitat survey may be required if suitable habitat exists where work is proposed to demonstrate how the project will avoid and minimize impacts.

   b. **Submerged Aquatic Vegetation.** *Submerged aquatic vegetation* [37]*(SAV) serves as important food sources and habitat for many marine species, in addition eelgrass meadows and kelp forests help protect shorelines from wave damage and take in carbon*

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[37] For the purposes of this RGP, SAV is defined as floating or submerged aquatic vegetation including macroalgae and native eelgrass.

from the atmosphere. Photographs of the lower shore zone should be taken of the project area at low tide from June 1 through October 1 to most accurately reflect vegetation distribution. Include descriptions of the type and abundance of all seagrasses, kelp, macroalgae or other SAV located on the property where work is proposed. If installing a mooring buoy, underwater photographs should be taken that show at least a 25 foot diameter buffer around the location of the anchoring device. If the project area is located in area with dense SAV or if native eelgrass (*Zostera marina*) exists on the property where work is proposed, a survey may be required to demonstrate how the project will avoid and minimize impacts.

c. **Wetlands.** *Wetlands are biologically productive natural ecosystems and applicants should avoid impacting them for the project and during construction.* Freshwater or saltwater wetlands on the property where work is proposed must be identified on the project drawings. If wetlands will be impacted as part of the project, a wetland delineation must be submitted and wetland compensatory mitigation may be required. Please also describe any proposed wetland buffer impacts.

d. **Riparian Vegetation.** *Riparian areas and shoreline vegetation are integral parts of the marine ecosystem.* Photographs should be taken of the existing (pre-construction) riparian zone which, for purposes of this RGP, is a zone the length of the property and 50 foot laterally from the high tide line. Please include a description of the size/density of all trees, shrubs and grasses. In addition, provide an estimate of the percent cover of impervious surface within this zone.

Application Resources: Commonly used forms and information papers can be found on the Seattle District Corps website at www.nws.usace.army.mil, select “Regulatory Branch”, “Permit Information.” Many documents referenced here are considered “living documents” and may be updated as new information or best management practices are developed.

- *As-built/Status Report for Mitigation Work Completion Form*
- *Certificate of Compliance Form*
- *WDFW Eelgrass/Macroalgae Habitat Interim Survey Guidelines*
- *Drawing Checklist*
- *Components of a Complete Eelgrass Delineation Report*
- *Components of a Complete Wetland Delineation Report*
- *Use of the Puget Sound Nearshore Habitat Values Model with HEA (NMFS White Paper)*
- *Hydraulic Project Approval information can be on WDFW’s website: http://wdfw.wa.gov/hab/hpapage.htm*
- *Forage fish habitat information can be found on WDFW’s Conservation website and the Department of Ecology’s “Coastal Atlas” website but the absence of documented habitat does not preclude its existence.*
- *Joint-Use Agreement Template* [to be posted when finalized]
- *Major Estuary Zone maps*
- *Marbled Murrelet Monitoring Protocol*
- *Mitigation Planting Monitoring Report Form (for riparian planting sites)*
- *Regional General Permit Biological Assessment and Addenda* [to be posted when finalized]
- *Riparian Planting Mitigation Plan Requirements*
- *Work Windows, Marine Waters and Tidal Reference Area Map*

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Agency and Tribal Notification and Review Process:

Once a complete application package is received, it will be reviewed by a Corps Regulatory Project Manager to ensure appropriate avoidance, minimization and compensatory mitigation is proposed. The application will then be sent to the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) to ensure ESA and MSA requirements are met. NMFS and USFWS will reply within a 30 calendar day period. Concurrently, a brief project description, including compensatory mitigation and project drawings will be sent to each federally recognized Native American Tribe with an interest in the project area to solicit comments in order to meet the tribal trust responsibilities of the Federal Government. Any relevant comments or objections received during these processes will be forwarded to the applicant for their response which could include project/mitigation revisions.

RGP-6 General Permit Conditions:

1. Reliance on Permittee's Information. In verifying a permittee's authorization under this RGP, the Department of the Army has relied, in part, on the information provided by the permittee. If this information proves to be false, incomplete, or inaccurate, the permittee's authorization may be modified, suspended, or revoked, in whole or in part. If the authorization is revoked, any work completed under the authorization must be removed, without expense to the United States.

2. Compliance with Terms and Conditions. Projects authorized by RGP-6 shall comply with all terms and conditions contained herein. Failure to abide by these terms and conditions invalidates this authorization and may result in a violation of Federal law, which may require that the permittee restore the site, take other remedial action or could result in the assessment of criminal or civil penalties. Activities requiring Department of the Army (DA) authorization that are not specifically authorized by this RGP are prohibited unless authorized by another DA permit.

3. Deed Recording: A copy of the completed application form, permit drawings, compensatory mitigation plan, and final authorization letter shall be recorded with the local government (Registrar of Deeds in the county or city of the project location), within 60 calendar days of the date of the RGP-6 authorization, to ensure that subsequent property owners are aware of the permit and mitigation requirements. Proof of this must be provided to the Corps within 65 calendar days after the date of the Corps' RGP authorization letter to the permittee. **If the overwater structure is joint-use**, all co-applicants must sign a *Joint-Use Agreement* to voluntarily agree to build no additional overwater structures on their property, except for the maintenance or modification of the proposed joint-use overwater structure. Maintenance is not covered by this RGP. This voluntary agreement and documentation must be recorded on the deeds of all involved property owners.

4. Coastal Zone Management Act Consistency: [process initiated]
5. Contractor's Copy of Permit. The permittee shall provide complete copies of this permit and the Corps RGP-6 authorization letter for the project to each contractor involved in the project and keep copies of this permit and Corps authorization letter available for inspection at the project site.

6. Compliance Certification. Every permittee shall submit to the Corps, within 30 days of completing the authorized work, certification that the work, including any required compensatory mitigation, was conducted in accordance with the provisions of this RGP, including project-specific Special Conditions. This requirement can be met with the submittal of a completed *Certificate of Compliance Form*.

7. Access for Inspection. The permittee shall allow the DE or designee to inspect the project whenever deemed necessary to ensure the activity is in compliance with the terms and conditions prescribed herein.

8. Limits of Authorization. This permit does not:
   a. Obviate the requirement to obtain all other Federal, State, or local authorizations required by law for the activity authorized herein, including any authorization required from Congress.
   b. Convey any property rights, either in real estate or material, or any exclusive privileges.
   c. Authorize any injury to property, invasion of rights, or any infringement of Federal, State, or local laws or regulations.
   d. Authorize the interference with any existing or proposed Federal project.

9. Limits of Federal Liability. This permit is not an approval of the design features of any authorized project or an implication that such project is adequate for the intended purpose; a DA permit merely expresses the consent of the Federal Government to conduct the proposed work insofar as public rights are concerned. In issuing this RGP, the Federal Government does not assume any liability for the following:
   a. Design or construction deficiencies associated with the authorized work.
   b. Damages to the permitted project or uses thereof as a result of other permitted activities or from natural causes, such as flooding.
   c. Damages to persons, property, or to other permitted or unauthorized activities or structures caused by the activity authorized by this permit.
   d. Damages associated with any future modification, suspension, or revocation of this permit.
   e. The removal, relocation, or alteration of any structure or work in navigable waters of the United States ordered by the Secretary of the Army or his authorized representative.
   f. Damage to the permitted project or uses thereof as a result of current or future activities undertaken by, or on behalf of, the United States in the public interest.

10. Tribal Rights. No activity authorized by this RGP may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

11. State Owned Aquatic Lands. Projects proposed on state owned aquatic lands require approval from the Washington Department of Natural Resources (DNR) and if approved, will require a *Site Use Authorization*. Applicants should contact DNR's Aquatic Resources Division at (360) 902-1100 or via email at ard@dnr.wa.gov for more information. Their website is: www.dnr.wa.gov.

12. Obstruction of Navigation. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration of the work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work unreasonably obstructs the full and free use of navigable waters of the United States, the permittee shall, upon due notice from the Corps, remove, relocate, or alter the obstructions caused thereby, without expense to the United States. If the permittee fails to comply with the direction of the Corps, the DE may restore the navigable capacity of the waterway, by contract or otherwise, and recover the cost thereof from the permittee.

13. Stability. The permittee shall design projects to be stable against the forces of flowing water, wave action, and the wake of passing vessels.

14. Maintenance. The permittee shall properly maintain all authorized structures, including maintenance necessary to ensure public safety. RGP-6 does not cover any maintenance work, the applicant must submit a separate application to the Corps for future maintenance actions.

15. Marking Structures. The permittee shall install any lights, signals, or other appropriate markers necessary to clearly designate the location of structures or work that might pose a hazard to public safety. Permittees shall abide by U.S. Coast Guard requirements concerning the marking of structures and work in navigable waters of the United States.

16. Endangered Species. This RGP requires that permittees avoid, minimize and compensate for effects to species listed or proposed under the Endangered Species Act (ESA). The Corps permit decision is considered a Federal action that must comply with the ESA. The ESA is administered by the NMFS and the USFWS. The ESA requires all Federal agencies to consult with NMFS and/or the USFWS pursuant to Section 7 of the ESA, on any action, or proposed action, permitted, funded, or undertaken by the agency that may affect a species listed as threatened or endangered under the ESA, or its designated critical habitat. The Corps has determined that activities that would be authorized by this RGP may affect federally listed species. [process initiated]

17. Essential Fish Habitat. This RGP requires that permittees avoid, minimize and compensate for effects to essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (MSA). The MSA requires all Federal agencies to consult with the NMFS on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). The Corps has determined that issuance of this RGP may adversely affect EFH for federally managed fisheries in Washington waters. [process initiated]

18. Marine Mammal Protection Act. The Marine Mammal Protection Act (MMPA) defines "take" to mean "to hunt, harass, capture, or kill" any marine mammal or attempt to do so. This RGP does not include an Incidental Take Permit from the NMFS. *It is the applicant's responsibility to ensure that no "take" of marine mammals occurs as a result of the construction or operation of any work authorized by this RGP.*

19. Historic Properties and Cultural Resources. The permittee shall perform any work authorized by the Corps in accordance with Section 106 of the National Historic Preservation Act (NHPA) and Corps regulations and avoid impacts to the historic property until the DE or their designee verifies that the requirements of 33 CFR Part 325, Appendix C, have been satisfied. Historic properties include prehistoric and historic archeological sites, and areas or structures of cultural interest. An applicant or permittee must notify the Corps if a proposed activity may affect a potential historic property and shall not begin work that would impact the property until notified by the Corps that the requirements of the NHPA have been satisfied and that the activity is authorized. If a previously unknown historic property is encountered during work authorized by this RGP, the permittee shall immediately cease all ground disturbing activities in the immediate area and notify the Corps within 1 business day of discovery.

20. Water Quality Standards. All activities authorized herein that involve a discharge of dredged or fill material into waters of the United States shall, at all times, remain consistent with all applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards, and management practices established pursuant to the Clean Water Act (P.L. 92-500; 86 Stat. 816) or pursuant to applicable State and local law.

Note: Boaters can help protect Puget Sound by using pump-out stations to remove sewage from their holding tanks. For a list of pump-out stations go to the Department of Ecology's website: http://www.ecy.wa.gov. There are also mobile pump-out barges that will come to your location. It is the applicant's responsibility to ensure compliance with the water quality requirements of the Department of Ecology and the Environmental Protection Agency (EPA) and any relevant local regulations.

20. Water Quality Certification. [process initiated]

21. Soil Erosion and Sediment Controls. The permittee shall avoid removing vegetation and use appropriate erosion and sediment controls during all staging and construction activities. The permittee shall remove all installed manmade controls as soon as they are no longer needed to control erosion or sediment.

22. Equipment. During construction, the permittee shall place heavy equipment on removable mats, or take other appropriate measures to minimize disturbance to wetlands, native soil and woody vegetation. Work barges may not ground out at any time.

23. Aquatic Life Movements. The permittee shall avoid, minimize and mitigate impacts to avoid disrupting the necessary life-cycle movements and migration patterns of those species that require access to the waterbody.

24. Disposal of Excess Material. All construction debris and any other material not authorized by the Corps for permanent placement into waters of the United States shall be disposed of in an upland location in a manner that precludes it from entering waters of the United States.

Modification, Suspension, or Revocation of RGP-6: This RGP may be modified or suspended in whole or in part if the Secretary of the Army or his authorized representative determines the individual or cumulative impacts of work that would be authorized by RGP-6 are contrary to the public interest. The final decision whether to modify, suspend, or revoke this permit, in whole or in part, shall be made pursuant to procedures prescribed by the Chief of Engineers. Following such revocation, any future activities heretofore authorized by this RGP will require alternate DA authorization.

The authorization of an individual project under this RGP may also be summarily modified, suspended, or revoked, in whole or in part, if the permittee either fails to abide by the terms and conditions of this permit or provides information that proves to be false, incomplete, or inaccurate, or upon a finding by the DE or their designee that such action would be in the public interest. If a permittee's authorization is revoked, the permittee shall, upon notice of such revocation, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former condition. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

Expiration of the RGP: This permit shall become effective on the date of the signature of the District Engineer or his/her authorized representative and will automatically expire 5 years from that date unless the permit is modified, revoked, or extended prior to that date. Activities that have commenced (i.e., are under construction) or are under contract to commence in reliance upon this permit will remain authorized provided that the activity is completed within 1 year of the date of this permit's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization.

APPENDIX A: Regional General Permit 6 (RGP-6) Application Form

Structures in Inland Marine Waters of Washington State
Version: [DATE OF ISSUANCE]

Please fully complete this RGP-6 application form including Appendix B and attach a vicinity map, project and mitigation plans and drawings, photographs, required surveys and all other required information at the same time. You must provide hard copies of all documentation; submittal of an electronic copy on a disc is strongly recommended.

Submit all application materials to: U.S. Army Corps of Engineers, Seattle District, Regulatory Branch, Post Office Box 3755, Seattle, Washington 98124-3755

SECTION A: Corps and Programmatic ESA Consultation Reference Numbers (NWS-2002-1291, RGP-6)

NMFS Reference Number: [TO BE ADDED WHEN COMPLETE] for [SPECIES TO BE ADDED WHEN COMPLETE]

USFWS Reference Number: [TO BE ADDED WHEN COMPLETE] for [SPECIES TO BE ADDED WHEN COMPLETE]

Reference Number For This Project: [CORPS PROVIDES TO APPLICANT UPON RECEIPT OF APPLICATION]

SECTION B: General Information

1. **Date:**

2. **Applicant name**:

Mailing address: ____

Home phone:	Alternate phone:	Email:

3. **Authorized agent name**:

Company name:

Mailing address: ____

Work phone:	Alternate phone:	Email:

4. **Contractor's name**:

Company name:

Mailing address: ____

Work phone:	Alternate phone:	Email:

SECTION C: Project Information

5. **Location where proposed work will occur** (street address, city, county): _________

¼ Section: _____ Section: _____ Township: _____ Range: _____

Latitude: __________ Longitude: __________ Parcel Number ____________________ HUC:

6. **Work Type(s):** ____ (e.g., pier, ramp, float, buoy, watercraft lift)

Provide a detailed description of proposed work and proposed compensatory mitigation. All measurements must be listed (do not just refer to the drawings). Include proposed building materials, construction methods and timing of the work. The locations and amounts of all impacts including excavation and the placement of fill material must be specifically identified (in volume and square feet). Include staging areas and access roads, and any other proposed ground-disturbing activities, including those in wetlands or uplands.

7. **Joint-Use Overwater Structure:**

If joint-use, you must list the other waterfront property owners: name, address, and telephone number, as co-applicants. You must als provide a joint use agreement (Agreement) signed by all involved property owners; the Agreement must state that each property own voluntarily agrees to build no overwater structures on their property except for the maintenance or modification of the authorized join use overwater structure. Upon issuance of the permit for the joint use overwater structure, all property owners must record this Agreement on their property deeds.

Co-applicant Name: ____

Mailing address: ____

Work phone:	Alternate phone:	Email:

Attach additional information if there is more than one co-applicant.

8. **Existing Structures** (See Page 2 for the limits on the total number of structures allowed)

Are there any existing structures at the project location? _____ If so, provide the type of structure and year of construction or installation of each structure and attach a copy of the Corps permit for the existing structures (if known):

Terms and Conditions of RGP-6 and Conservation and Construction Specifications: For authorization under RGP-6, all Conservation and Construction Specifications described in Section D of this form must be implemented as they are terms and conditions of RGP-6. Check each item in this section of the application that you agree to implement or deem "not applicable" and fill in your specific project information.

SECTION D –Conservation and Construction Specifications[38] with Specific Project Information

Conservation and Construction Specification	Specific Project Information	I (We) Will Implement	I (We) Will Not Implement	Not Applicable
1. PIERS (a flat deck structure supported by piling) or LANDINGS and STEPS of a stairway				
a. The width of the pier must not exceed 4 feet for single-use and 6 feet for joint-use.	Width of pier: _________ feet Length of pier: _________ feet	☐	☐	☐
b. Pier surfaces and stairway landings and steps must be entirely grated with either multi-directional grating with 40% open space or square grating with 60% open space.	Type of grating proposed:	☐	☐	☐
c. The pier must be a straight line (finger "ell" or "T" shaped piers are not authorized by this RGP).		☐	☐	☐
d. The construction of new structures on piers, (i.e., buildings, planter boxes, slides, etc.) are not authorized by this RGP except utility boxes.	If a utility box will be installed provide dimensions and detail:	☐	☐	☐
e. Stairways must be open-frame construction and not a solid structures (i.e., concrete).		☐	☐	☐
f. The width of stairway landings and steps must not exceed 4 feet for single-use and 6 feet for joint-use.		☐	☐	☐
2. FLOATS (a flat deck structure supported by flotation devices)				
a. For a **single use** structure the float width must not exceed 8 feet and the length cannot exceed 30 feet. Functional grating must be installed on at least 50% of the surface area of the float.	Length of float: _________ feet Width of float: _________ feet	☐	☐	☐

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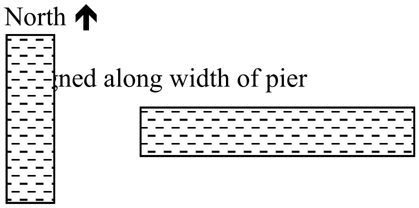
[38] Variances will be considered for persons with disabilities on a case-by-case basis and changes in overwater coverage will be factored into the mitigation calculations.

b. For a **joint-use** structure the float width must not exceed 8 feet and the length cannot exceed 60 feet. Functional grating must be installed on at least 50% of the surface area of the float.	Length of float: __________ feet Width of float: __________ feet	☐	☐	☐
c. Floats should be installed with the length of the float aligned in the north-south direction to the maximum extent practicable.		☐	☐	☐
d. Floats may be held in place with lines anchored with a helical screw or "duckbill" embedded anchor, piles with stoppers and/or float support/stub piles. (1) For a **single-use** float, a maximum of 4 piles (not including stub piles) or embedded anchors may be installed. (2) For a **joint-use** float, a maximum of 8 piles (not including stub piles) or embedded anchors may be installed. (3) If embedded anchors need to be utilized, the anchor lines shall not rest on the substrate at any time; each must contain a mid-line float. (4) Only if the substrate prohibits use of piles or embedded anchors may a Corps-approved alternative be used.		☐	☐	☐
e. If a concrete anchor or other Corps-approved alternative is needed to hold the float, calculations showing that it will hold without dragging or breaking during storm events are required. This analysis should include the size of the float and the dry weight and dimensions of the anchor.		☐	☐	☐
f. If the float is removed seasonally, the applicant must disclose this and provide the storage location. Floats must be stored in the uplands landward of the high tide line or at an approved in-water location. *Separate Corps authorization will be required for in-water storage (even in a marina).*	Storage location: __________ Latitude: __________ Longitude: __________	☐	☐	☐
g. Flotation for the structure must be fully enclosed and contained in a shell (tub) and only contain material suitable for the marine environment. The shell must prevent breakup or loss of the flotation material into the water.	Floatation material: __________	☐	☐	☐
h. Flotation shall be installed under the solid portions of the float, not under the grating (unless the entire float is grated).		☐	☐	☐
i. If the float is positioned perpendicular to the ramp, a small access float may be installed to accommodate tidal movement of the ramp. The access float cannot be larger than 6 feet wide and 10 feet long.	Length of access float: __________ feet Width of access float: __________ feet	☐	☐	☐
j. No floats may be installed in the Upper Shore Zone (approximately landward of +5 MLLW).		☐	☐	☐
3. FLOAT STOPS				
a. To suspend the float above the substrate at all tides, float stops (stoppers) should be installed on piles anchoring new floats. This method is preferred over 3b and 3c because float stops are less impacting to the marine environment.		☐	☐	☐

b. If float stops attached to piles are not feasible (provide explanation) then up to four 10-inch diameter stub pilings may be installed instead.	Proposed number and material of stub piles: ____ (wood is generally preferred over steel)	☐	☐	☐
c. Float "feet" attached to the float may be considered an option only if the substrate consists of coarse material as described in the column to the right. If you propose to install float "feet", check the box that best describes substrate conditions on the project site at the location of the float. Documentation on the elevation and substrate size must also be provided.	☐ In coarse substrate, D25[39] of 25 mm or larger for a grain size sample taken from upper 1 foot of substrate ☐ For elevations of -3 feet MHHW and lower at D25 of 4 mm or larger for a grain size sample taken from upper 1 foot of substrate (to exclude installing float feet in muck)	☐	☐	☐
4. RAMPS (a sloped deck structure typically connecting a pier and a float)				
a. The width of the ramp cannot exceed 4 feet.	Length of ramp: ____ feet Width of ramp: ____ feet	☐	☐	☐
b. Ramps must be fully grated with either multi-directional grating with 40% open space or square grating with 60% open space.		☐	☐	☐
5. MARINE RAILS				
RGP-6 authorizes either a marine rail at least 20 feet long or an overwater structure, but not both. Support marine rails with as few piles as practicable.	Length of each rails ____feet Number of support pilings ____	☐	☐	☐
6. GRATING				
a. Grating must not be covered (on the surface or underneath) with any items (e.g., kayaks, planters, sheds, lawn chairs, etc.) except utility boxes.		☐	☐	☐
b. Provide grating type and manufacturer to document % open area. Grating must be <u>entirely</u> grated with either multi-directional grating with a minimum of 40% open space or square grating with a minimum of 60% open space.	Grating Type/Manufacturer: ____ (may provide website of manufacturer)	☐	☐	☐
c. Grating openings should be oriented lengthwise in the east-west direction to the maximum extent practicable. See diagrams showing orientation of the grated openings.	 Aligned along the length of the pier	☐	☐	☐
7.1. PILES, FILL (for stairways or trams)				
a. Proposed new piles may be steel, concrete, plastic, untreated wood or wood treated with approved wood preservatives per Section 8 of this document.	Material of new piling: ____	☐	☐	☐
b. Piling supporting a new pier must be spaced no closer than 20 feet apart.	Number of new piling: ____	☐	☐	☐
c. A maximum of 2 moorage piles may be installed to accommodate the moorage of boats exceeding the length of the floats.	Number of moorage piling: ____	☐	☐	☐
d. Any piles subject to abrasion must incorporate design features to minimize contact between all of the different components of overwater structures during all tidal elevations.	How will abrasion be minimized? ____	☐	☐	☐

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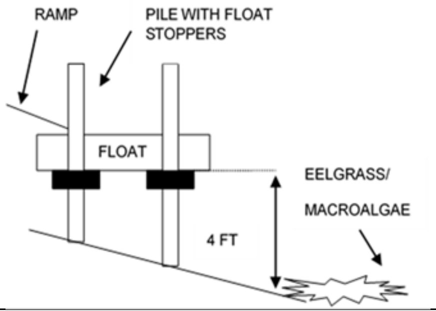
[39] "D25 of 25mm" means that 25% of the substrate has a grain size of 25 mm or less.

e. For anchoring of tram cables or footings for stairs: No more than one cubic yard of fill can be used for each footing or anchor. The number and size of footings and anchors must be minimized.		☐	☐	☐
f. Forms must be removed after concrete has cured.		☐	☐	☐
7.2. PILE DRIVING				
a. Vibratory or impact hammer installation of wood, concrete, plastic, or other non-metal piles of any size is allowed under this RGP. However, the smallest diameter and number of piles required to construct a safe structure should be proposed and appropriate pile driving methods employed to minimize underwater sound. *Note: NMFS and USFWS biologists will review each proposal to ensure best management practices are included for the species they protect.*	Installation method (vibratory or impact hammer): ______________________	☐	☐	☐
b. Pile driving must occur during daylight hours only, for a maximum of 12 hours per day.		☐	☐	☐
c. Impact installation of steel piles is only allowed for steel piles up to 12 inches in diameter. If steel piles are proposed, a vibratory pile driver is preferred for installation.		☐	☐	☐
d. If Southern Resident Killer whales (an ESA-listed species) have been documented more than four times during the proposed work window (typically June – February) in the quadrant the project area is located in, a *Marine Mammal Monitoring Plan* (MMMP) must be prepared and submitted with this application. This information will be reviewed by a NMFS biologist. NOAA's website identifies these quadrants and contains guidance on the potential for ESA-listed marine mammal occurrences in project areas: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/evaluating_sound.html	☐ Monitoring plan attached Guidance for developing an MMMP can be found on NOAA's website: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/monitoring_plan_guidance.html	☐	☐	☐
e. If in one or both of the previous two years there were four or more Humpback whale sightings during the month you propose to work in, in the basin where pile driving will occur, a MMMP must be submitted. Check the Orca Network Sightings Map: http://www.orcanetwork.org/Archives/index.php?categories_file=Sightings%20Archives%20Home for Humpback whale sightings. For questions on which Puget Sound Basin your project is in, please see the map in Schlenger et al. 2011. Purple areas are considered to be part of both basins: Hood Canal South Puget Sound South/Central Puget Sound North Central Puget Sound Whidbey Basin Strait of Juan de Fuca San Juan Islands and Georgia Strait	If a MMMP has to be implemented for either SRKW or humpback whales monitoring must occur for either species. ☐ Monitoring plan attached	☐	☐	☐

<table>
<tr><td>f. All pile driving must cease <u>immediately</u> if any marine mammal is within 300 feet of the project, and shall only continue once the animal is beyond 300 feet.</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">g. If steel piles must be installed or proofed with an impact hammer, you must provide rationale and complete the table below. For each diameter class of steel piles (include stub piles if applicable) that will be impact proofed or driven, provide the maximum number of strikes per pile, the maximum number of piles that will be installed per day, and the maximum number of days needed to install all piles. Include rationale why an impact hammer must be used instead of vibratory installation methods. All of this information will be reviewed by a USFWS biologist and a <i>Monitoring Protocol for Marbled Murrelets</i> may be required.
<table>
<tr><td>Day</td><td>Diameter</td><td>Number of piles</td><td>Number of piles</td><td>Total Number of strikes/day</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>h. When installing steel piles that are up to 12 inches in diameter with an impact hammer, 300 impact pile strikes per day must not be exceeded.</td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>i. When installing piles larger than 6 inches in diameter, to stay below the noise threshold, the number of strikes per day is limited to 300 and sound attenuation devices must include:
(1) Placement of a block of wood (minimum of 6 inches thick) between the hammer and the pile, and;
(2) Use of a bubble curtain that distributes air around 100% of the perimeter of the pile. The curtain must be designed/operated so that bubbles originate from the bottom and flow at all times during impact pile driving.</td><td>Include a description if different sound attenuation devices are proposed.
Note: Hydro-acoustic monitoring may be required by USFWS for monitoring marbled murrelets. USFWS will make this determination when reviewing the pile data in item “g” above and the Marbled murrelet monitoring plan.</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>j. Piles larger than 12 inches in diameter may be allowed on a case-by-case basis when using alternative designs or materials (i.e., double walled piling). You must provide details on the alternative design or materials to show they have been proven to achieve more than 10 decibel sound attenuation so that 183 decibel Sound Exposure Level is not exceeded.</td><td>☐ An explanation of how the work will meet sound thresholds is attached.</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td colspan="5">8. TREATED WOOD</td></tr>
<tr><td>a. Creosote, pentachlorophenol, chromated copper arsenate, or other wood preservative compounds not approved for use in inland marine waters by the Environmental Protection Agency (EPA) may not be used for any portion of the overwater structure.
Ammoniacal copper zinc arsenate (ACZA) piles may not be used in forage fish spawning habitat or on State-owned lands.</td><td>Type of Treated Wood Proposed:
____
☐ Treatment Certification from the Wood Preservers Institute is attached. http://www.wwpinstitute.org/
OR
☐ Certification from the EPA describing the suitability of the proposed wood preservative for the marine environment is attached.</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>9. WATERCRAFT/LIFTS AND GRIDS</td><td></td><td></td><td></td><td></td></tr>
<tr><td>a. A description of the watercraft to be moored at the overwater structures must be provided.</td><td>Type:
Size: (length and width)</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>b. Watercraft may not rest on the tidal substrate at any time.</td><td>How will grounding be prevented?</td><td>☐</td><td>☐</td><td>☐</td></tr>
</table>

c. Up to two watercraft lifts may be installed at a single-use overwater structure and up to four may be installed at a joint-use structure.	Number of watercraft lifts proposed: __________ Size: __________ (length and width) Type of watercraft lifts: __________ (ground based, suspended or floating)	☐	☐	☐
d. A maximum of 2 additional piles may be used to attach a watercraft lift/grid to the piles used for anchoring the floats.		☐	☐	☐
10. MOORING BUOYS				
a. Only one mooring buoy per property may be authorized by this RGP.		☐	☐	☐
b. The location of the anchor for the buoy must be identified on the project drawings; provide the latitude and longitude.	Latitude: __________ Longitude: __________	☐	☐	☐
c. Anchor lines must not rest or drag on the substrate. A mid-line float must be installed to prevent this from occurring.		☐	☐	☐
d. Anchors should be helical screw or another type of embedded anchor. Only if the substrate prohibits use of embedded anchors may a Corps-approved alternative anchor (i.e., concrete block) be used.	If an embedded anchor is not used, you must attach a written explanation for why site conditions would not support an embedded anchor.	☐	☐	☐
e. If an embedded anchor cannot be used and a concrete anchor is needed, calculations showing that the anchor will hold without dragging or breaking during storm events are required. This analysis should include the size of the vessel and the dry weight and dimensions of the anchor.		☐	☐	☐
f. No more than 3 other buoys may be anchored within a 117 foot radius of the proposed buoy.	Show all existing buoys within a 117 foot radius of the proposed buoy on the project drawings.	☐	☐	☐
g. New mooring buoys may not be installed in any waterbody the Washington State Department of Health has designated as "threatened" or "closed" to shellfish harvesting due to the number of boats moored there.	The Corps will publish a list of closed waterbodies in a *Special Public Notice* (posted on our website) as they are added or removed from this list.	☐	☐	☐
Note: *Please review the following links to determine whether a Washington State Dept. of Natural Resources permit is also needed:* http://www.dnr.wa.gov/recreationeducation/howto/homeowners/pages/aqr_mooring_buoy.aspx http://washingtondnr.wordpress.com/2011/06/01/how-to-authorize-a-mooring-buoy-with-dnr/				
Note: *Buoys must be installed in accordance with the marking and lighting requirements of the U.S. Coast Guard (33 CFR 330.5(a)(1*				
11. SUBMERGED AQUATIC VEGETATION[40] (SAV) and MARINE PLANT SURVEYS				
a. The applicant must submit a SAV and marine plant delineation/survey for the project area within 25 feet of proposed structures. If SAV or marine plants are found within that area then you must provide a survey of the entire property and demonstrate avoidance and minimization.		☐	☐	☐
b. If overwater structures will be installed less than 25 feet away from SAV and marine plants, the applicant must clearly demonstrate that there are no other practicable locations of the structures.		☐	☐	☐

c. Minimization measures include elevating the structure at least 4 feet above the substrate at low tide to reduce prop scour impacts on SAV.		☐	☐	☐
12. FORAGE FISH HABITAT				
a. If there is documented or potential forage fish habitat in the project area, you must show the extent of this habitat on a project drawing. Maps of ***documented*** forage fish habitat can be found at: http://wdfw.maps.arcgis.com/home/webmap/viewer.html?webmap=19b8f74e2d41470cbd80b1af8dedd6b3&extent=-126.1368,45.6684,-119.6494,49.0781	Is there ***documented*** forage fish spawning habitat within 4,200 feet of the project site? Herring: ☐ Yes ☐ No Surf smelt: ☐ Yes ☐ No Sand lance: ☐ Yes ☐ No	☐	☐	☐
b. If there is *potential* forage fish habitat a survey may be required depending on the information provided by the applicant on the existing conditions at the site. See Appendix C, Glossary, for a description of ***potential*** forage fish spawning habitat.	Is there ***potential*** forage fish spawning habitat in the project area? ☐ No ☐ Yes	☐	☐	☐
c. If there is no alternative to constructing piers and ramps over forage fish spawning habitat, they must span at least 40 feet to minimize the number of piles in the habitat.	Number of piles proposed in forage fish habitat: __________	☐	☐	☐
d. If there is no way to avoid impacts to forage fish (Pacific herring, surf smelt and sand lance) spawning habitat, **50% more mitigation is required** (see Appendix B**).**		☐	☐	☐
13. WORK WINDOWS				
a. The work will be conducted during the typical in-water work window. Please refer to *Marine Water Work Windows* on the Corps website.	Note: Work windows in the Hydraulic Project Approval issued by the WA Dept. of Fish and Wildlife may be different than Corps required work windows. If this is the case, you should combine the work windows and use the most restrictive.	☐	☐	☐
b. If there is documented forage fish spawning habitat at the project site and there is no approved work window for forage fish prior to construction, the applicant must have a qualified biologist approved by WDFW's science staff confirm, in writing, that no forage fish are spawning in the project area during the proposed construction. If the Corps confirms the biologist's assessment, the permittee has 48 hours to begin work and 2 weeks from the date of inspection to complete all work in the intertidal zone.	Note: WDFW maintains a list of trained biologists on their website.	☐	☐	☐

c. The following work window restriction is in place whenever steel piles will be driven or proofed with an impact hammer: (1) All pile driving operations are only authorized to occur between 2 hours after sunrise and 2 hours before sunset during marbled murrelet nesting season (April 1 to September 15).		☐	☐	☐
14. WORK IN THE DRY				
a. Work that involves excavation of the substrate, bank, or upper shore zone shall occur in the dry or at low tide.		☐	☐	☐
15. OPERATION OF EQUIPMENT				
a. Use of equipment on the beach shall be held to a minimum, confined to a single access point, and limited to a 12-foot work corridor on either side of the proposed work. Preferably, equipment shall be operated from the top of the bank, on a temporary work platform, barge, or similar out-of-water location.		☐	☐	☐
b. Equipment shall be operated in a way that minimizes turbidity.		☐	☐	☐
c. Barges may not ground out at any time. Spud barges can be used if there is the possibility of grounding.		☐	☐	☐
d. Any disturbance of the beach areas, waterward of the high tide line, by construction activities or equipment, shall be restored to the original pre-project conditions upon the immediate completion of construction and mitigation work.		☐	☐	☐
16. MINIMAL DISTURBANCE OF RIPARIAN ZONE				
a. Clearing of uplands and slopes could precipitate erosion which may take several years to manifest. Existing habitat features (e.g., vegetation, large wood) shall be retained to the extent possible to avoid causing erosion and to maintain food sources, shading and other ecological functions important to water quality and aquatic species.		☐	☐	☐
b. Disturbance of bank vegetation shall be limited to a "work strip" area no wider than twice the width of the structure.		☐	☐	☐
c. The applicant must disclose if woody vegetation with a diameter at breast height (DBH) of 4 inches or greater needs to be removed to construct the project.	Describe woody vegetation to be removed: __________	☐	☐	☐
d. Trees that must be removed should be installed along the shoreline as habitat features where possible. Any anchors for securing large wood should be buried.		☐	☐	☐
e. Disturbed bank vegetation shall be replaced with native species appropriate for the site. A Planting Plan must be provided and approved by the Corps. Plantings must be installed during the appropriate time of year and within one year of construction.	☐ Re-planting Plan attached.	☐	☐	☐
f. Vegetation on the face of the bluff should be avoided and not be removed, trimmed or altered. If there is no alternative but to impact vegetation on the face of the bluff, it should be done so in accordance with a slope stability plan/report. If vegetation is cleared, mitigation will be determined on a case-by-case basis based on the type and amount of vegetation removed or altered.	☐ Engineering Slope Stability Report attached.	☐	☐	☐

17. MITIGATION				
a. Applicant must complete Appendix B and, if applicable, submit a mitigation plan and drawings.		☐	☐	☐
18. SKIRTING				
a. Skirting on any portion of an overwater structure is <u>not</u> authorized by this RGP.		☐	☐	☐
19. LIGHTING				
a. Artificial lighting of the marine environment should be minimized to the extent possible. If lighting is proposed, it should be included on the project drawings and will be included in the review process.		☐	☐	☐
GENERAL CONDITIONS				
All RGP-6 General Conditions starting on page 4 of the *Full Text for RGP-6* will be met.		☐	☐	☐

APPLICATION IS HEREBY MADE FOR A PERMIT TO AUTHORIZE THE ACTIVITIES DESCRIBED HEREIN. I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS APPLICATION, THE TERMS AND CONDITIONS OF REGIONAL GENERAL PERMIT 6 (RGP-6), AND THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, SUCH INFORMATION IS TRUE, COMPLETE, AND ACCURATE. I FURTHER CERTIFY THAT I POSSESS THE AUTHORITY TO UNDERTAKE THE PROPOSED ACTIVITIES. I HEREBY GRANT TO THE AGENCIES TO WHICH THIS APPLICATION IS MADE, THE RIGHT TO ENTER THE ABOVE-DESCRIBED LOCATION TO INSPECT THE IN-PROGRESS OR COMPLETED WORK. I VOLUNTARILY AGREE TO MEET ALL REQUIREMENTS OF THIS RGP. I AGREE TO START WORK <u>ONLY</u> AFTER ALL NECESSARY LOCAL AND STATE PERMITS HAVE BEEN RECEIVED.

I ALSO ACKNOWLEGE AND UNDERSTAND THAT ANY CHANGE IN PROJECT LOCATION AND/OR PROJECT AND MITIGATION PLANS REQUIRES SUBMITTAL OF THE REVISED PLANS TO THE CORPS IN ORDER TO OBTAIN APPROVAL <u>BEFORE</u> WORK COMMENCES. DEVIATING FROM APPROVED PLANS WITHOUT PRIOR APPROVAL MAY RESULT IN THE ASSESSMENT OF CRIMINAL OR CIVIL PENALITES.

I CONSENT TO THE PERMITTING AGENCIES ENTERING THE PROPERTY WHERE THE PROJECT IS LOCATED TO INSPECT THE PROJECT SITE OR ANY WORK. THESE INSPECTIONS SHALL OCCUR AT REASONABLE TIMES AND, IF PRACTICAL, WITH PRIOR NOTICE TO THE LANDOWNER. THE PROPERTY OWNER SIGNATURE (IF NOT THE APLICANT) IS NOT REQUIRED IF THE PROJECT IS ON EXISTING RIGHT-OF-WAY OR EASEMENTS.

________________________________ ______________________

Signature of Applicant **Date**

________________________________ ______________________

Signature of Authorized Agent **Date**

________________________________ ______________________

Signature of Contractor (if known) **Date**

________________________________ ________________________________ __________________

Property Owner Printed Name **Property Owner Signature**
Date

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

APPENDIX B: Compensatory Mitigation Requirements and Calculations

RGP-6: Structures in Inland Marine Waters of Washington State
Version: [DATE OF ISSUANCE]

Reference Number For This Project: [CORPS PROVIDES TO APPLICANT UPON RECEIPT OF APPLICATION]

Avoidance, Minimization and Compensatory Mitigation. *Before proposing compensatory mitigation the applicant must first demonstrate that impacts to waters of the U.S., including special aquatic sites have been avoided then minimized (in that order) to the maximum extent possible.* To calculate compensatory mitigation requirements, review Table 1 (Vegetation Scenario) before filling out Table 2 (Mitigation Calculations) which will provide the total number of mitigation points required for the project. The final step is to choose from the available mitigation options listed in Table 3 (Mitigation Options).

Table 1. Vegetation Scenario.

Determine the Vegetation Scenario for each zone within 25 feet of the proposed project.	*Vegetation Scenario*
≤10%	0
11% –30%	1
31% –70%	2
>70%	3

IMPORTANT NOTE: If forage fish spawning habitat, eelgrass, or kelp is present, a multiplier of 1.5 is included in Table 2 to account for impacts to these important marine resources. ***Be sure to provide all supporting documentation and surveys.***

Use the following information to complete Table 2:

a. Upper Shore Zone (USZ) is the area landward of +5 MLLW
b. Lower Shore Zone (LSZ) is the area waterward of +5 MLLW and landward of -10 MLLW, or lowest elevation of SAV.
c. Deep Shore Zone (DSZ) is the area that begins waterward of where the LSZ ends and extends to 98 feet below MLLW. If SAV extends to -98 feet below MLLW, the LSZ would extend to that point and there would be no DSZ.

Figure 1. Graphic Depiction of Shoreline Zones.

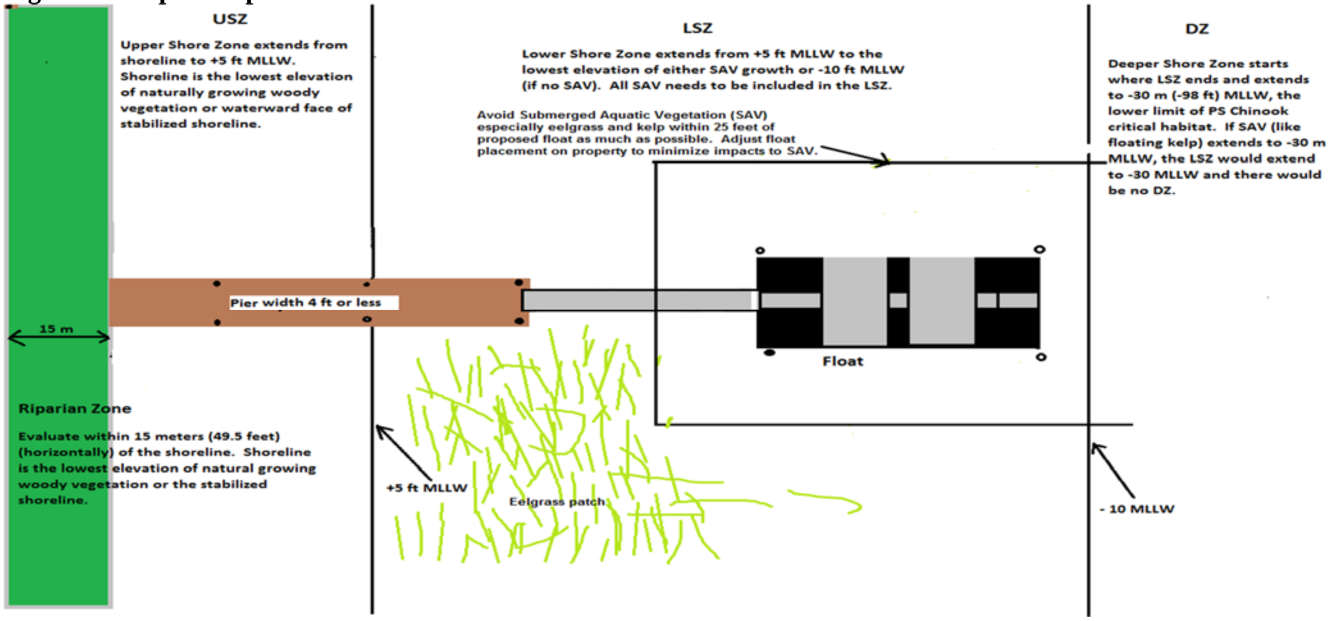


Table 2. Mitigation Calculations. This table is based on NMFS' characterization of adverse impacts from overwater structures on salmonid habitat in Puget Sound utilizing the Habitat Equivalency Analysis methodology.

HABITAT ZONES AND CALCULATIONS OF IMPACTS			**MITIGATION POINTS (MPs)**
Riparian Zone Impacts **(From the high tide line to 50 feet landward of the high tide line)**			
If woody vegetation with a diameter at breast height (DBH) of 4 inches or greater in the riparian work strip needs to be permanently cleared for access to the overwater structure:	Add 1.45 MPs per 100 square feet for removal of woody vegetation. See glossary for definition of "work strip".		_____ MP
Upper Shore Zone (USZ) Impacts **(From the high tide line to +5 feet MLLW)**			
For any vegetation scenario: if the width of the structure is ≤ 4 feet for single use or ≤ 6-feet for joint-use, no mitigation points are required:	No calculations necessary for this section.		**0** MP
For any vegetation scenario, if the width of the structure is > 4 feet for single use or > 6-feet for joint-use, insert the square footage and complete the formula:	$\left\lceil 0.4 \times \frac{\text{s.f.}}{100} \right\rceil + 0.1 =$ _____ MP ☐ If the USZ is documented or potential forage fish habitat **and** the piles are spaced closer than 40feet along the length of the pier, multiply the number of MP's by 1.5		_____ MP
Lower Shore Zone (LSZ) Impacts **(Lower than +5 feet MLLW to -10 feet MLLW and limits of SAV)**			
Pier and Piles			
For any vegetation scenario, if the structure is fully grated and width is ≤ 4 feet for single use or ≤ 6 feet for joint-use, no mitigation points are required:	No calculations necessary for this section.		**0** MP
For any vegetation scenario, if the structure is fully grated and width is > 4-feet for single use or > 6-feet for joint-use, insert the square footage and complete the formula:	$\left\lceil 1 \times \frac{\text{s.f.}}{100} \right\rceil + 0.3 =$ _____ MP		_____ MP
Floats			
Insert the square feet of float(s) into the formula, including access float and piles, located in the LSZ where the float is 50% grated with 60% open space and there are 8 or less piles. See Table 1 for the Vegetation Scenario Table and choose the appropriate option.	Vegetation Scenario 0	$\left\lceil 3.5 \times \frac{\text{s.f.}}{100} \right\rceil + 7.2$	_____ MP
	Vegetation Scenario 1	$\left\lceil 4.8 \times \frac{\text{s.f.}}{100} \right\rceil + 8.9$	_____ MP
	Vegetation Scenario 2	$\left\lceil 6.1 \times \frac{\text{s.f.}}{100} \right\rceil + 10.6$	_____ MP
	Vegetation Scenario 3	$\left\lceil 7.4 \times \frac{\text{s.f.}}{100} \right\rceil + 12.3$	_____ MP
Floating watercraft lifts			
Insert the square feet of floating watercraft lifts located in LSZ and complete the calculations in the formula.	Vegetation Scenario 0	$\left\lceil 2.2 \times \frac{\text{s.f.}}{100} \right\rceil$	_____ MP
	Vegetation Scenario 1	$\left\lceil 3.5 \times \frac{\text{s.f.}}{100} \right\rceil + 4.5$	_____ MP

	Vegetation Scenario 2	$\left[4.9 \times \frac{\text{s.f.}}{100}\right]$	_____ MP
	Vegetation Scenario 3	$\left[6.3 \times \frac{\text{s.f.}}{100}\right]$	_____ MP
Deeper Shore Zone (DSZ) Impacts (Deeper than -10-feet MLLW or outer limits of SAV)			
Insert the square footage of floats located in the DSZ and complete the calculations in the formula.		$\left[1.8 \times \frac{\text{s.f.}}{100}\right] + 1.4$	_____ MP
SUB-TOTAL NUMBER OF MITIGATION POINTS (Add up the Total MP for <u>each</u> Zone): _____ M			
Debiting Factors for Environmental Conditions (See the glossary for more information on these topics)			
If the project is located within a pocket estuary, bluff- backed beach, or pocket beach multiply the subtotal by 1.5.			_____ MP
If the project is located within documented or potential forage fish spawning habitat multiply the subtotal by 1.5.			_____ MP
If the project is located within a Major Estuary Zone (see Appendix C, Glossary for definition; see Corps webpage for maps showing zones) multiply the subtotal by 1.5.			_____ MP
TOTAL REQUIRED MITIGATION POINTS (SUB-TOTAL WITH DEBITING FACTORS):			**_____ MP**

Table 3. Mitigation Options. To compensate for the impacts of your project, you must implement any combination of the following mitigation options to total the amount of mitigation points calculated in Table 2 for your project. Conservation and Construction Specifications described in Section D apply to mitigation measures listed in Table 3. Additional CMs for mitigation include: Work in intertidal will be performed in the dry as much as possible.

Mitigation Points (MP)	Descriptions of Mitigation Options
0.35 MP per 100 SF of planted native woody vegetation directly behind existing shoreline stabilization 0.7 MP per 100 SF of planted native woody vegetation within 50 feet of the high tide line where there is fully functioning shoreline	Plant native trees and shrubs landward of the high tide line where there previously was invasive vegetation, lawn, or impervious surface. No structures such as sheds or boathouses may separate vegetation from the water. All native woody vegetation needs to remain in their natural state for the life of the permitted overwater structure. A site protection mechanism must be placed on planted area. See glossary for a description of site protection mechanisms. The permit and mitigation planting area must be recorded on the deed. As-built drawings should be submitted upon installation of the mitigation (and within one year of construction), or a status report should be submitted instead (temporal loss may increase the amount of mitigation required). Vegetation establishment needs to be maintained, monitored with reports submitted to the Corps annually for 5 years [for emergent and scrub/shrub systems and for monitoring years 1, 3, 5, 7, and 10 for forested systems]. For additional monitoring and planting requirements see *Riparian Plantings Requirements* document on the Corps' webpage.
MP determined on a case-by-case basis depending on the area	Placement of spawning gravel over areas where down cutting of beach profile has been documented and where it would benefit forage fish. This includes sites of documented and potential forage fish spawning as well as sites up-drift of spawning areas. It must be shown that this mitigation option is suitable and would provide an ecological lift to the mitigation site. The source, type and size of gravel must be specified as well as the elevations where the material will be placed. The mitigation site should be researched to ensure that the appropriate material is proposed. This option may require multiple years of beach nourishment to be effective.
7.2 MP 10 MP if area is (one of the following): • adjacent to existing forage fish spawning habitat • located in a pocket estuary or beach • within 5 miles of a major estuary	Install large woody material (LWM) in 2000 square feet* of the USZ and LWM needs to remain in place for the life of the permitted overwater structure. A site protection mechanism must be placed on mitigation area. See glossary for a description of site protection mechanisms. * This area requirement may be reduced if the applicant can demonstrate that the proposed location and spacing of LWM mimics historic conditions at that specific location. The applicant should coordinate with WDFW or NMFS to reconstruct historic conditions of LWM at the project location.
0.5 MP per pile	Remove non-treated wood, ACZA, concrete, plastic, or steel piles located in the tidal substrate (if the pile is creosote-treated wood, use MMO #4 instead). This option will require before and after photographs and a map showing the location of the piles to be removed.
1 MP per pile	Remove creosote-treated wood piles located in the tidal substrate. This option will require before and after photographs and a map showing the location of the piling to be removed.

	Guidance on disposal of treated wood can be found online: www.ecy.wa.gov/programs/hwtr/demodebris/pages2/demowood.html
0.1 MP per 100 SF	Permanently prevent an existing float, that currently grounds out, from resting on the tidal substrate (must be elevated at least 1 foot above the tidal substrate)
Use Table 1 to determine MP*	Remove part or all of an existing overwater structure. This option will require before and after photographs and a map showing the location and length and width of the structure to be removed. *For example, if you remove a 5- by 40-foot pier in the LSZ where there is 10% SAV, you will be providing 5.3 MPs
0.8 MP per linear foot removed and planted 1.2 MP per linear foot removed and planted if the removed structure was (<u>one</u> of the following): • adjacent to existing forage fish spawning habitat • located in a pocket estuary or beach • within 5 miles of a major estuary 1.7 MP per linear foot removed and planted if <u>two</u> of the above bulleted items were met	Completely remove hardened bank stabilization and plant at least a 10-foot wide buffer along the shoreline with native vegetation (must meet planting requirements described in MMO #1). This option will require before and after photographs and a map showing the location of the structure to be removed. Please contact the Corps for applicable mitigation points for partially removing hard bank stabilization and partial replanting of riparian buffer.
3 MP per 100 SF 4.5 MP per 100 SF removed if the area was (<u>one</u> of the following): • adjacent to existing forage fish spawning habitat • located in a pocket estuary or beach • within 5 miles of a major estuary 6.8 MP per 100 SF removed if <u>two</u> of the above bulleted items were met	Remove an entire or portion of an existing manmade groin. This option will require before and after photographs and a map showing the location and length and width of the structure to be removed.
Varies, contact Corps for calculation	Complete or partial removal of hardened bank stabilization and in its place a pocket beach is constructed. Example designs can be found online at: http://www.kitsapshoreline.org/Kitsap_Shoreline_Booklet_Final_62910.pdf http://your.kingcounty.gov/dnrp/library/water-and-land/shorelines/0709-fact-sheets/Bulkheads.pdf
Varies, contact Corps for calculation	Remove an entire or portion of an existing boat ramp. The number of mitigation points varies depending on the size of the ramp. This option will require before and after photographs, a description of the boat ramp, and a map showing the length and width of the ramp.

Varies, contact Corps for calculation	Remove an entire or portion of an existing marine railway (two rails and support structures). The number of mitigation points varies depending on the length. This option will require before and after photographs, a description of the marine railway, and a map showing the length and width of the marine railway.
Varies, contact Corps for calculation	Third Party Mitigation – purchase credits from an approved mitigation or conservation bank and/or in-lieu fee (ILF) program. Current information on available mitigation banks or ILF programs can be found on the Washington Department of Ecology's website: http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/index.html
Varies, contact Corps for calculation	Off-site Mitigation – Corps approved permittee responsible mitigation. See examples below. Submit a mitigation plan for Corps review and approval. Plan will include type and location of mitigation. Depending on the type of proposed mitigation, individual ESA-consultation may be required. A site protection mechanism must be placed on mitigation area. See glossary of this document for a description of site protection mechanisms. Examples of other mitigation options that may be considered: • Improve habitat conditions of a stream (i.e., remove a fish barrier culvert) that has a confluence with inland marine waters; mitigation work should occurwithin1,000 linear feet of the high tide line • Setback or removal of shoreline armoring • Creation of pocket beaches • Reducing hardness of armored shorelines using bio-engineering • Buffer enhancement within 50 feet of the high tide line • Installation of large woody material • Shoreline restoration projects • Removal of derelict fishing gear and other debris from the nearshore environment • Other compensatory mitigation proposed by the applicant (all mitigation options must occur within the same waters where RGP-6 is applicable)

Brief Description of Proposed Mitigation with Total Points: ***(Attach mitigation plan with maps/drawings)***

Mitigation plans should be commensurate with the scale and scope of the impacts and prepared in accordance with the Federal *Compensatory Mitigation for Losses of Aquatic Resources Final Rule* (33 CFR Parts 332, April 10, 2008). See the "Mitigation" section of the U.S. Army Corps of Engineers Regulatory Branch website for additional information.

RGP-6 APPENDIX C: Glossary

RGP-6: Structures in Inland Marine Waters of Washington State
Version: [DATE OF ISSUANCE]

The terms in this glossary are defined for use with this RGP.

Bank is the rising ground bordering the waterbody forming an edge or steep slope.

Bluff-backed beaches are defined as beaches which terminate at the toe of a steep bluff.

Conservation Banking is a tool for conserving listed plant and animal species and their habitat through Section 7 and Section 10 of the ESA. Conservation banks are lands (usually large tracts) acquired by third parties to be managed specifically for these species and protected in perpetuity by a conservation easement. Conservation banks develop and sell credits within a specified Service Area to offset adverse impacts to listed species that occur elsewhere.

DBH (diameter at breast height) is the diameter of a tree (in inches) at the point 4.5 feet above the ground, measured from the uphill side.

Davit is a crane or hoist that is attached to the pier and projects over the water and is used to lift boats out of the water.

Dolphin is a piling assemblage

Endangered and Threatened Species: An endangered species is in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered in the foreseeable future.

Float support piling or *stub piling* are piling used to suspend the float above the tidal substrate. The float rests on top of the float support piling, not the tidal substrate.

Forage fish spawning habitat: For the following forage fish species, Pacific herring *(Clupea pallasii)* spawning habitat is roughly defined as: eelgrass and macroalgae located between 0 to -10 feet tidal elevation; surf smelt (*Hypomesus pretiousus*) – substrate consisting of pea gravel or coarse sand (gravel diameter 0.005 – 0.35 of an inch) between the high tide line to +7 feet tidal elevation relative to the Seattle tide gauge; Pacific sand lance (*Ammodytes hexapterus*) – substrate consisting of pure fine grain sand beaches between the high tide line to +5 feet tidal elevation, relative to the Seattle tide gauge. Note that forage fish eggs may be found at higher elevations than the high tide line near the toe of the bank and the appropriate tidal gage should be used for your location.

- *Documented* forage fish spawning habitat is habitat inspected and determined by WDFW to support actual forage fish spawning.
- *Potential* forage fish spawning habitat is habitat with the characteristics of forage fish spawning habitat but no actual forage fish spawning has been documented by WDFW.

Functional Grating is grating which is not covered or blocked underneath by any objects, such as float tubs.

Groin is a rigid structure (constructed of rock, wood, or other durable material) built out from the shore, usually perpendicular to the shoreline, to prevent erosion or trap sand.

Hardened shoreline is the area of shoreline that is no longer natural but has been replaced with structures, including but is not limited to concrete, rock or timber bulkheads, riprap, or concrete boat ramp access.

High Tide Line in the Seattle District is currently Mean Higher High Water (MHHW). This is the elevation on the shore of tidal waters reached by the plane of the average of the higher of the two daily high tides, generally averaged over a period of 19 years. This has been established at set tide gauges throughout Washington. Tide gauge information may be obtained online: http://www.nws.usace.army.mil/Missions/CivilWorks/Regulatory/PermitGuidebook/Streams.aspx. Should the Seattle District redefine the high tide line, that definition will supersede this definition.

Inland marine waters in Washington State are tidally influenced waters within the state of Washington limited to the marine waters ranging from South Puget Sound and Hood Canal to and including the Strait of Juan de Fuca and the Strait of Georgia. This does not include the outer coast adjoining the Pacific Ocean or tidally influenced rivers (above river mile "zero") draining into these water bodies.

In-lieu fee program refers to a program involving the restoration, establishment, enhancement and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for DA permits. Similar to a mitigation bank, an in-lieu fee (ILF) program sells compensatory mitigation credits to permittees whose obligation to provide mitigation is then transferred to the program sponsor. The sponsor must use the funds pooled from multiple permittees within a specified service area to restore, establish, enhance and/or preserve one or more mitigation receiving sites. The operation and use of an ILF program are governed by an ILF Program Instrument.

Joint-use piers, floats, and ramps are constructed and utilized by property owners on more than one residential waterfront property or by a homeowner's association that owns waterfront property.

Major Estuary Zone is the transition zone at the confluence of the freshwater tributaries listed below and tidal waters. See maps showing these zones on our webpage at: www.nws.usace.army.mil, select Regulatory Branch, Permit Information, go to the "Permit Guidebook" webpage, then select "Permitting, Regional General Permits," and look at Major Estuary Zone maps.

In Puget Sound:

1. Nooksack River
2. Skagit River
3. Stillaguamish River
4. Snohomish
5. Snoqualmie River
1. Duwamish River
2. Puyallup River
3. Chambers Creek
4. Nisqually River
5. Deschutes River

In Hood Canal:

6. Union River
7. Tahuya River
8. Skokomish River
9. Lilliwaup Creek
10. Dewatto Creek
11. Hamma Hamma River
12. Eagle Creek
13. Duckabush River
14. Dosewallips River
15. Big Beef Creek
16. Stavis Creek
17. Little Anderson Creek
18. Seabeck Creek
19. Big and Little Quilcene River

In the Strait of Juan de Fuca:

20. Chimacum Creek
21. Salmon/Snow Creeks
22. Jimmycomelately Creek
23. Dungeness River
24. Morse Creek
25. Elwha River

Mean high water (MHW) The elevation on the shore of tidal waters reached by the plane of the average of the lower of the two daily high tides, generally averaged over a period of 19 years. This elevation has been established at set tide gauges throughout Washington. Tide gauges information may be obtained online:
http://www.nws.usace.army.mil/Missions/CivilWorks/Regulatory/PermitGuidebook/Streams.aspx

Mitigation Bank refers to a site where wetland and/or other aquatic resources are restored, established, enhanced and/or preserved expressly for the purpose of providing compensatory mitigation in advance of unavoidable and authorized impacts to similar resources. Mitigation credits generated at the bank are sold to permittees whose obligation for all aspects of the compensatory mitigation is then transferred to the mitigation bank sponsor. Mitigation banks have specific service areas where the bank is authorized to operate.

Mooring Buoys means non-commercial, single-boat mooring buoys. Information about State requirements can be found online on the Department of Natural Resources website.
http://www.dnr.wa.gov/RecreationEducation/HowTo/Homeowners/Pages/aqr_mooring_buoy.aspx

Native species do not include hybrids or cultivars such as dwarf varieties of plants. Please include the genus and species when describing existing or proposed plants at the project and/or mitigation site.

Offsite means outside the property boundaries of the property owner(s) proposing the project. For the purpose of this RGP, the property boundary in the water, unless already shown on a deed or legal description, is a straight-line extension of the property line on the land, projected waterward, and perpendicular to the shoreline.

Onsite means within the property boundaries of the property owner(s) proposing the project. For the purpose of this RGP, the property boundary in the water, unless already shown on a deed or legal description, is a straight-line extension of the property line on the land, projected waterward, and perpendicular to the shoreline.

Open area or *open space* of grating is the area enclosed between the rectangular bars and cross-rods in bar grating, or the area enclosed between the bonds and strands in expanded grating.

Overwater structures are defined as piers, ramps, floats, marine rails, mooring buoys, piling, steps, open-frame stairways, bluff-to beach trams, watercraft grids or lifts.

Pocket Estuaries are defined as small sheltered areas along the shoreline that have freshwater influence at least part of the year. The location of pocket estuaries can be found at https://fortress.wa.gov/ecy/coastalatlas/tools/Map.aspx (Under “Contents”, select “Pocket Estuaries”). The lateral extent of each pocket estuary is the protected (pocket or lagoon feature) area.

Project area is defined as the area the overwater structure will cover and 25 feet on all sides of the structures including landward of the line of the high tide line.

Remove means the removal of material from the area waterward of the High Tide Line to be disposed of in an upland location or approved disposal area landward of the High Tide Line using the appropriate best management practices.

Single-use piers, floats, and ramps are constructed and utilized by only one residential waterfront property owner.

Site protection mechanisms includes a description of the legal arrangements and instruments, including mitigation site ownership that will be used to ensure the long-term protection of the compensatory mitigation project, such as:

- Deed Recording: Deed recording requires that the permittee record on the deed for the mitigation site property a copy of the DA permit, drawings, and a description of the mitigation area identified in the final mitigation plan.
- Restrictive Covenants: A restrictive covenant (often called a deed restriction) is a provision in a deed limiting the use of the property by prohibiting certain uses. The restrictive covenant is established by the land owner and does not include a third party. It is recorded against the property title and runs with the land.
- Conservation Easements: It is a legal restriction placed on a piece of property to protect the resources (natural or man-made) associated with the parcel. It restricts the type and amount of activities that can take place on a parcel of land. Easements are recorded on the property deed and are held in trust by a conservation easement "holder" such as a land trust or government agency.

Skirting is vertical boards attached to the edge of a pier extending downward.

Special aquatic sites are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas may be impossible or difficult to replace and are recognized as significantly contributing to the health of the ecosystem (i.e., sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, riffle and pool complexes). (40 CFR Part 230)

Submerged aquatic vegetation is defined as floating or submerged aquatic vegetation including macroalgae and native eelgrass

Treated wood preservatives are chemicals used to control wood degradation. The EPA reviews registered pesticides every 15 years to determine whether it continues to meet the statutory standard of no unreasonable adverse effects on human health or the environment. The EPA is the authority on the suitability of treated wood products in the marine environment and should be contacted for more information.

Uplands are non-wetland areas landward of the high tide line.

Watercraft lift is a free-standing, floating, or pier-affixed device which supports a watercraft and prevents the watercraft from resting on the tidal substrate.

Work strip is the upland area temporarily disturbed for the construction of the overwater structure and should be as narrow as possible and no more than twice the width of the structure. *Pier width = 4 feet; Work Strip = 8 feet*

8. APPENDIX II: Areal Analysis of Wallochet Bay OWS

PRF without boats	**PRF with boats**	**number of floating boat lifts**	**number of unassociated boats (mooring buoy not visible because of resolution)**	**number of unassociated grounded out boats**	**marine rails**	**Floats only**
12	25	17	24	11	1	9

Source: Google Earth 7.5/2015 5pm. Wollochet Bay along East Bay Drive of Wallochet Bay/ E- side of Bay.