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

Refer to NMFS No.:
WCRO-2020-00558

June 4, 2024

Constance Callahan
Environmental Management Branch Chief
United States Coast Guard
Civil Engineering Unit Oakland
1301 Clay Street, Suite 700N
Oakland, California 94612-5203

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation and Conference for the U.S. Coast Guard Sector Field Office Port Angeles Bank Stabilization Project, Clallam County, Washington.

Dear Ms. Callahan:

This letter responds to your July 18, 2023, request for initiation of consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and analysis because it met our screening criteria and contained all required information on, and analysis of, your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed the U.S. Coast Guard's (USCG) consultation request and related initiation package. Where relevant, we have adopted the information and analyses you have provided and/or referenced but only after our independent, science-based evaluation confirmed they meet our regulatory and scientific standards. In our biological opinion below, we indicate what parts of your document(s) we have incorporated by reference and where that information is being incorporated.

We adopt by reference the following sections of the biological assessment (BA):

- Section 2 for the proposed federal action;
- Section 5 for the status of the species and critical habitat;
- Sections 3 and 4 for the action area;
- Section 3 for the environmental baseline; and,
- Section 6 for the effects of the action.

We have provided clarification where we have included additional or unique information to what was provided in the BA. In particular, we have referred to additional published literature and other NMFS biological opinions for our analysis of effects.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

The NMFS has not yet promulgated an ESA section 4(d) rule prohibiting take of threatened southern DPS of eulachon (hereafter, "eulachon"). However, consultation under section 7(a)(2) of the ESA is still required to evaluate whether or not the Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of designated critical habitat.

Per 50 CFR § 402.10, we have also completed a conference opinion on the sunflower sea star (*Pycnopodia helianthoides*)[1] as it is currently a species proposed for listing under the ESA. An opinion issued at the conclusion of the conference may be adopted as the biological opinion when the species is listed or critical habitat is designated, but only if no significant new information is developed (including that developed during the rulemaking process on the proposed listing or critical habitat designation) and no significant changes to the Federal action are made that would alter the content of the opinion.

Hereafter, the combination of the biological opinion and conference opinion are referred to as a singular "Opinion".

Consultation History

On March 3, 2020, the USCG requested informal consultation for the proposed Pier Maintenance and Bank Stabilization at Air Station Port Angeles Project.

On July, 18, 2023, the USCG updated the project description and requested formal consultation. From July 2023 to January 2024 the USCG and NMFS had several meetings to refine the project.

On January 8, 2024, the USCG submitted a letter, as a final part of the consultation package, committing to a mitigation/conservation bank or in-lieu fee program to offset impacts (as calculated in the Nearshore Conservation Calculator) within 3 years of the start of construction (Appendix A). At that time, NMFS initiated consultation.

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[1] https://www.federalregister.gov/documents/2023/03/16/2023-05340/proposed-rule-to-list-the-sunflower-sea-star-as-threatened-under-the-endangered-species-act

Proposed Action

As described in section 2 of the BA, the USCG Project will repair up to 372 feet of eroded riprap shoreline, replace 37 degraded timber piles with steel piles, jacket up to 98 timber piles, permanently remove 11 abandoned timber piles, demolish 3 steel camel barrier piles and 2 camels, replace a 300-foot wave abatement boom, and make other repairs to the pier and wave attenuation wall. The proposed action will also remove approximately 2,500 square feet of rubble from the beach and 75 tons of creosote. The total debits associated with the project, as calculated in the Nearshore Conservation Calculator, is -92. The proposed action includes a commitment on record by the USCG to satisfy this debit within 3 years of the start of construction. (See summary pages in Appendix B; full excel calculators available upon request).

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). We adopt by reference sections 3 and 4 of the BA for the description of the action area. The action area extends beyond the USCG Project footprint and includes both terrestrial and aquatic impact zones to the extent of noise impacts from pile driving, 4642 meters.

Species likely to occur in the action area include:

1. Puget Sound (PS) Chinook salmon
2. PS steelhead
3. Hood Canal summer run chum
4. Eulachon, southern distinct population segment (DPS)
5. Green sturgeon, southern DPS
6. Southern resident killer whale (SRKW)
7. Humpback whale
8. Sunflower sea star

Designated critical habitat occurs in the action area for:

1. PS Chinook
2. Green sturgeon, southern DPS
3. SRKW

Figure 1. Action area

BIOLOGICAL OPINION

Status of Species and Critical Habitat

We examined the status of each species that would be adversely affected by the proposed action to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. We also examined the condition of critical habitat throughout the designated area and discuss the function of the physical or biological features essential to the conservation of the species that create the conservation value of that habitat.

For status of species and critical habitat, we adopt by reference section 5 of the BA. We supplement this section with the following summary of the effects of climate change on ESA listed species and their critical habitat below and tables with additional information on these species and their critical habitat from our most recent status updates (**Table 1**).

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Major ecological realignments are already occurring in response to climate change (IPCC WGII, 2022). Long-term trends in warming have continued at global, national and regional scales. Global surface temperatures in the last decade (2010s) were estimated to be 1.09 °C higher than the 1850-1900 baseline period, with larger increases over land ~1.6 °C compared to oceans ~0.88 (IPCC WGI, 2021). The vast majority of this warming has been attributed to anthropogenic releases of greenhouse gases (IPCC WGI, 2021). Globally, 2014-2018 were the 5 warmest years on record both on land and in the ocean (2018 was the 4th warmest) (NOAA NCEI 2022). Events such as the 2013-2016 marine heatwave (Jacox et al. 2018) have been attributed directly to anthropogenic warming in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). Global warming and anthropogenic loss of biodiversity represent profound threats to ecosystem functionality (IPCC WGII 2022). These two factors are often examined in isolation, but likely have interacting effects on ecosystem function.

Updated projections of climate change are similar to or greater than previous projections (IPCC WGI, 2021). NMFS is increasingly confident in our projections of changes to freshwater and marine systems because every year brings stronger validation of previous predictions in both physical and biological realms. Retaining and restoring habitat complexity, access to climate refuges (both flow and temperature) and improving growth opportunity in both freshwater and marine environments are strongly advocated in the recent literature (Siegel and Crozier 2020). Climate change is systemic, influencing freshwater, estuarine, and marine conditions. Other systems are also being influenced by changing climatic conditions. Literature reviews on the impacts of climate change on Pacific salmon (Crozier 2015, 2016, 2017, Crozier and Siegel 2018, Siegel and Crozier 2019, 2020) have collected hundreds of papers documenting the major themes relevant for salmon. Here we describe habitat changes relevant to Pacific salmon and steelhead, prior to describing how these changes result in the varied specific mechanisms impacting these species in subsequent sections.

Marine and Estuarine Environments

Along with warming stream temperatures and concerns about sufficient groundwater to recharge streams, a recent study projects nearly complete loss of existing tidal wetlands along the U.S. West Coast, due to sea level rise (Thorne et al. 2018). California and Oregon showed the greatest threat to tidal wetlands (100%), while 68% of Washington tidal wetlands are expected to be submerged. Coastal development and steep topography prevent horizontal migration of most wetlands, causing the net contraction of this crucial habitat.

Rising ocean temperatures, stratification, ocean acidity, hypoxia, algal toxins, and other oceanographic processes will alter the composition and abundance of a vast array of oceanic species. In particular, there will be dramatic changes in both predators and prey of Pacific salmon, salmon life history traits and relative abundance. Siegel and Crozier (2019) observe that changes in marine temperature are likely to have a number of physiological consequences on fishes themselves. For example, in a study of small planktivorous fish, Gliwicz et al. (2018) found that higher ambient temperatures increased the distance at which fish reacted to prey. Numerous fish species (including many tuna and sharks) demonstrate regional endothermy, which in many cases augments eyesight by warming the retinas. However, Gliwicz et al. (2018) suggest that ambient temperatures can have a similar effect on fish that do not demonstrate this trait. Climate change is likely to reduce the availability of biologically essential omega-3 fatty acids produced by phytoplankton in marine ecosystems. Loss of these lipids may induce cascading trophic effects, with distinct impacts on different species depending on compensatory mechanisms (Gourtay et al. 2018). Reproduction rates of many marine fish species are also likely to be altered with temperature (Veilleux et al. 2018). The ecological consequences of these effects and their interactions add complexity to predictions of climate change impacts in marine ecosystems.

Perhaps the most dramatic change in physical ocean conditions will occur through ocean acidification and deoxygenation. It is unclear how sensitive salmon and steelhead might be to the direct effects of ocean acidification because of their tolerance of a wide pH range in freshwater (although see Ou et al. 2015 and Williams et al. 2019), however, impacts of ocean acidification and hypoxia on sensitive species (e.g., plankton, crabs, rockfish, groundfish) will likely affect salmon indirectly through their interactions as predators and prey. Similarly, increasing frequency and duration of harmful algal blooms may affect salmon directly, depending on the toxin (e.g., saxitoxin vs domoic acid), but will also affect their predators (seabirds and mammals). The full effects of these ecosystem dynamics are not known but will be complex. Within the historical range of climate variability, less suitable conditions for salmonids (e.g., warmer temperatures, lower streamflows) have been associated with detectable declines in many of these listed units, highlighting how sensitive they are to climate drivers (Ford 2022, Lindley et al. 2009, Williams et al. 2016, Ward et al. 2015). In some cases, the combined and potentially additive effects of poorer climate conditions for fish and intense anthropogenic impacts caused the population declines that led to these population groups being listed under the ESA (Crozier et al. 2019).

Climate change effects on salmon and steelhead

In freshwater, year-round increases in stream temperature and changes in flow will affect physiological, behavioral, and demographic processes in salmon, and change the species with which they interact. For example, as stream temperatures increase, many native salmonids face increased competition with more warm-water tolerant invasive species. Changing freshwater temperatures are likely to affect incubation and emergence timing for eggs, and in locations where the greatest warming occurs may affect egg survival, although several factors impact intergravel temperature and oxygen (e.g., groundwater influence) as well as sensitivity of eggs to thermal stress (Crozier et al. 2020). Changes in temperature and flow regimes may alter the amount of habitat and food available for juvenile rearing, and this in turn could lead to a restriction in the distribution of juveniles, further decreasing productivity through density dependence. For migrating adults, predicted changes in freshwater flows and temperatures will likely increase exposure to stressful temperatures for many salmon and steelhead populations, and alter migration travel times and increase thermal stress accumulation for ESUs or DPSs with early-returning (i.e. spring- and summer-run) phenotypes associated with longer freshwater holding times (Crozier et al. 2020, FitzGerald et al. 2020). Rising river temperatures increase the energetic cost of migration and the risk of *en route* or pre-spawning mortality of adults with long freshwater migrations, although populations of some ESA-listed salmon and steelhead may be able to make use of cool-water refuges and run-timing plasticity to reduce thermal exposure (Keefer et al. 2018, Barnett et al. 2020).

Marine survival of salmonids is affected by a complex array of factors including prey abundance, predator interactions, the physical condition of salmon within the marine environment, and carryover effects from the freshwater experience (Holsman et al. 2012, Burke et al. 2013). It is generally accepted that salmon marine survival is size-dependent, and thus larger and faster growing fish are more likely to survive (Gosselin et al. 2021). Furthermore, early arrival timing in the marine environment is generally considered advantageous for populations migrating through the Columbia River. However, the optimal day of arrival varies across years, depending on the seasonal development of productivity in the California Current, which affects prey available to salmon and the risk of predation (Chasco et al. 2021). Siegel and Crozier (2019) point out the concern that for some salmon populations, climate change may drive mismatches between juvenile arrival timing and prey availability in the marine environment. However, phenological diversity can contribute to metapopulation-level resilience by reducing the risk of a complete mismatch. Carr-Harris et al. (2018), explored phenological diversity of marine migration timing in relation to zooplankton prey for sockeye salmon *O. nerka* from the Skeena River of Canada. They found that sockeye migrated over a period of more than 50 days, and populations from higher elevation and further inland streams arrived in the estuary later, with different populations encountering distinct prey fields. Carr-Harris et al. (2018) recommended that managers maintain and augment such life-history diversity.

Synchrony between terrestrial and marine environmental conditions (e.g., coastal upwelling, precipitation and river discharge) has increased in spatial scale causing the highest levels of synchrony in the last 250 years (Black et al. 2018). A more synchronized climate combined with simplified habitats and reduced genetic diversity may be leading to more synchrony in the productivity of populations across the range of salmon (Braun et al. 2016). For example, salmon productivity (recruits/spawner) has also become more synchronized across Chinook populations from Oregon to the Yukon (Dorner et al. 2018, Kilduff et al. 2014). In addition, Chinook salmon have become smaller and younger at maturation across their range (Ohlberger 2018). Other Pacific salmon species (Stachura el al. 2014) and Atlantic salmon (Olmos et al. 2020) also have demonstrated synchrony in productivity across a broad latitudinal range.

At the individual scale, climate impacts on salmon in one life stage generally affect body size or timing in the next life stage and negative impacts can accumulate across multiple life stages (Healey 2011; Wainwright and Weitkamp 2013, Gosselin et al. 2021). Changes in winter precipitation will likely affect incubation and/or rearing stages of most populations. Changes in the intensity of cool season precipitation, snow accumulation, and runoff could influence migration cues for fall, winter and spring adult migrants, such as coho and steelhead. Egg survival rates may suffer from more intense flooding that scours or buries redds. Changes in hydrological regime, such as a shift from mostly snow to more rain, could drive changes in life history, potentially threatening diversity within an ESU (Beechie et al. 2006). Changes in summer temperature and flow will affect both juvenile and adult stages in some populations, especially those with yearling life histories and summer migration patterns (Crozier and Zabel 2006; Crozier et al. 2010, Crozier et al. 2019).

At the population level, the ability of organisms to genetically adapt to climate change depends on how much genetic variation currently exists within salmon populations, as well as how selection on multiple traits interact, and whether those traits are linked genetically. While genetic diversity may help populations respond to climate change, the remaining genetic diversity of many populations is highly reduced compared to historic levels. For example, Johnson et al. (2018), compared genetic variation in Chinook salmon from the Columbia River Basin between contemporary and ancient samples. A total of 84 samples determined to be Chinook salmon were collected from vertebrae found in ancient middens and compared to 379 contemporary samples. Results suggest a decline in genetic diversity, as demonstrated by a loss of mitochondrial haplotypes as well as reductions in haplotype and nucleotide diversity. Genetic losses in this comparison appeared larger for Chinook from the mid-Columbia than those from the Snake River Basin. In addition to other stressors, modified habitats and flow regimes may create unnatural selection pressures that reduce the diversity of functional behaviors (Sturrock et al. 2020). Managing to conserve and augment existing genetic diversity may be increasingly important with more extreme environmental change (Anderson et al. 2015), though the low levels of remaining diversity present challenges to this effort (Freshwater 2019). Salmon historically maintained relatively consistent returns across variation in annual weather through the portfolio effect (Schindler et al. 2015), in which different populations are sensitive to different climate drivers. Applying this concept to climate change, Anderson et al (2015) emphasized the additional need for populations with different physiological tolerances. Loss of the portfolio increases volatility in fisheries, as well as ecological systems, as demonstrated for Fraser River and Sacramento River stock complexes (Freshwater et al. 2019, Munsch et al. 2022).

Table 1, provides a summary of listing and recovery plan information, and critical habitat status summaries for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. Acronyms appearing in the table include DPS (Distinct Population Segment), ESU (Evolutionarily Significant Unit), HC (Hood Canal), PBF (physical and biological feature), MLLW (mean lower low water).

Critical habitat is not yet proposed for the sunflower sea stars. We supplement the BA with more detail on the status of this proposed-for-listing species. Sunflower sea stars are native to marine waters along the Pacific Coast, from northern Baja California to the central Aleutian Islands. Although they can live in waters ranging from a few feet deep to greater than 1,400 ft. deep, sunflower sea stars are generally encountered in waters shallower than 120 ft. deep. This species was heavily affected by Sea Star Wasting Syndrome, beginning in 2013, the cause of which is unknown, but susceptibility appears to be influenced by rapid temperature change, decreased pH, increased pollution, and other physical and chemical parameters. Prior to 2013, the global abundance of P. helianthoides was estimated at several billion animals, but from 2013-17 sea star wasting syndrome (SSWS) reached pandemic levels, killing an estimated 90% plus of the population. Reduction in abundance in coastal British Columbia is somewhat less possibly in the 60-80 percent range (Lowry et al. 2022).

Table 1. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Puget Sound Chinook salmon	9/02/05 70 FR 52630	Critical habitat for Puget Sound Chinook salmon includes 1,683 miles of streams, 41 square mile of lakes, and 2,182 miles of nearshore marine habitat in Puget Sounds. The Puget Sound Chinook salmon ESU has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value.
Hood Canal summer-run chum	9/02/05 70 FR 52630	Critical habitat for Hood Canal summer-run chum includes 79 miles and 377 miles 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 9252	Critical habitat for Puget Sound steelhead includes 2,031 stream miles. 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.
Southern DPS of green sturgeon	10/09/09 74 FR 52300	Critical habitat has been designated in coastal U.S. marine waters within 60 fathoms depth from Monterey Bay, California (including Monterey Bay), north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento River, lower Feather River, and lower Yuba River in California; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; tidally influenced areas of the Columbia River estuary from the mouth upstream to river mile 46; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor), including, but not limited to, areas upstream to the head of tide in various streams that drain into the bays. Several activities threaten the PBFs in coastal bays and estuaries and need special management considerations or protection. The application of pesticides, activities that disturb bottom substrates/ adversely affect prey resources/ degrade water quality through re-suspension of contaminated sediments, commercial shipping and activities that discharge contaminants and result in bioaccumulation of contaminants in green sturgeon; disposal of dredged materials that bury prey resources; and bottom trawl fisheries that disturb the bottom/prey resources for green sturgeon.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Southern DPS of eulachon	10/20/11 76 FR 65324	Critical habitat for eulachon includes portions of 16 rivers and streams in California, Oregon, and Washington. All of these areas are designated as migration and spawning habitat for this species. In Oregon, we designated 24.2 miles of the lower Umpqua River, 12.4 miles of the lower Sandy River, and 0.2 miles of Tenmile Creek. We also designated the mainstem Columbia River from the mouth to the base of Bonneville Dam, a distance of 143.2 miles. Dams and water diversions are moderate threats to eulachon in the Columbia and Klamath rivers where hydropower generation and flood control are major activities. Degraded water quality is common in some areas occupied by southern DPS eulachon. In the Columbia and Klamath river basins, large-scale impoundment of water has increased winter water temperatures, potentially altering the water temperature during eulachon spawning periods. Numerous chemical contaminants are also present in spawning rivers, but the exact effect these compounds have on spawning and egg development is unknown. Dredging is a low to moderate threat to eulachon in the Columbia River. Dredging during eulachon spawning would be particularly detrimental.
Southern resident killer whale	08/02/21 86 FR 41668	Critical habitat includes approximately 2,560 square miles of marine inland waters of Washington: 1) the Summer Core Area in Haro Strait and waters around the San Juan Islands; 2) Puget Sound; and 3) the Strait of Juan de Fuca. Six additional areas include 15,910 square miles of marine waters between the 20-feet (ft) (6.1-meter (m)) depth contour and the 656.2-ft (200-m) depth contour from the U.S. international border with Canada south to Point Sur, California. We have excluded the Quinault Range Site. Based on the natural history of the Southern Residents and their habitat needs, NMFS identified three PCEs, or physical or biological features, essential for the conservation of Southern Residents: 1) Water quality to support growth and development; 2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth; and 3) passage conditions to allow for migration, resting, and foraging Water quality in Puget Sound, in general, is degraded. Some pollutants in Puget Sound persist and build up in marine organisms including Southern Residents and their prey resources, despite bans in the 1970s of some harmful substances and cleanup efforts. The primary concern for direct effects on whales from water quality is oil spills, although oil spills can also have long-lasting impacts on other habitat features In regards to passage, human activities can interfere with movements of the whales and impact their passage. In particular, vessels may present obstacles to whales' passage, causing the whales to swim further and change direction more often, which can increase energy expenditure for whales and impacts foraging behavior. Reduced prey abundance, particularly Chinook salmon, is also a concern for critical habitat.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Central America DPS Humpback Whales	4/21/2021 86 FR21082	Specific areas designated as occupied critical habitat for the Central America DPS of humpback whales contain approximately 48,521 nmi^2 of marine habitat in the North Pacific Ocean within the portions of the California Current Ecosystem off the coasts of Washington, Oregon, and California. The nearshore boundary is defined by the 50-m isobath, and the offshore boundary is defined by the 1,200-m isobath relative to MLLW. The Columbia River Area was rated with medium/low conservation value. The PBF for this species is prey species of sufficient quality, abundance, and accessibility to support feeding and population growth.
Mexico DPS Humpback Whales	4/21/2021 86 FR21082	Specific areas designated as critical habitat for the Mexico DPS of humpback whales contain approximately 116,098 nmi^2 of marine habitat in the North Pacific Ocean, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem. The PBF for this species is The PBF for this species is prey species of sufficient quality, abundance, and accessibility to support feeding and population growth.

Environmental Baseline

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

In addition to the information provided in section 3 of the BA for the environmental baseline of the action area, we provide the following supplemental information about the action area.

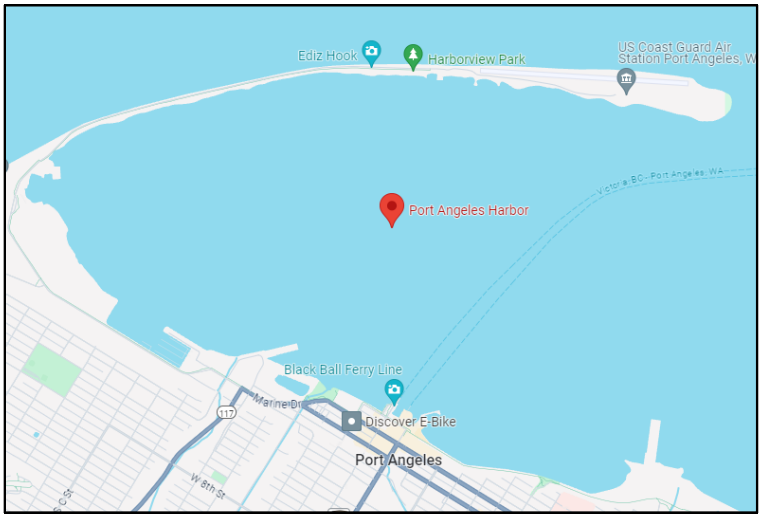

Figure 2. Port Angeles Harbor

Port Angeles Harbor

The USCG station lies within Port Angeles Harbor. The Harbor has been used heavily for over the years to support industrial activities. Contamination from sawmills, plywood, manufacturing, paper production, shipping and transport, boat building, bulk fuel facilities, marinas, and commercial fishing/processing have affected the aquatic substrate in the harbor which is currently ranked as an area of high concern for sediment contamination the State's Dredged Materials Management Program (DMMP) (Ecology 2012).

Substrate within Port Angeles Harbor is predominantly silty sand with intermixed gravels and shell hash in areas (Floyd Snider 2018). The Harbor is protected from strong currents by Ediz Hook, a large sand spit that extends from the shoreline into the Strait of Juan de Fuca to the north. By protecting the harbor from strong currents, a depositional "sink" is created in the inner harbor. This has resulted in a large proportion of fines within the generally silty/sandy substrate of the harbor. GeoSea (2009) reported fines comprised 71.1% (range 5.6% to 71.1 %, mean

56%) of substrate sampled adjacent to the Port of Port Angeles. Visual observations of core samples collected in 2017 were characterized as "silty sand with layers of 40 to 60 percent woody debris (up to 3 inches), with trace medium sand, gravel and shell hash. Fine wood fragments and vegetative material were observed in trace amounts in several of the cores. A sulfide-like odor was observed at the surface of all of the cores" (Floyd Snider 2018). Wood storage and transport in the harbor has led to heavy deposition of wood debris in portions of the harbor. The largest amounts of wood debris have been observed along the western shoreline of the inner harbor and along the base of Ediz Hook (Ecology 2012).

Forage Fish
Forage fish are an important group of fish in the marine waters of Washington. Forage fish serve an important role as pray for a variety of marine animals including birds, fish, and marine mammals. Pacific Herring, surf 'smelt, and Pacific sandlance are the most common forage fish in Puget Sound. All three species are known to occur import Angela's Harbor. Herring typically spawn in Northern Puget Sound and the Strait of one to Fuca occurs from late January through early April (Bargmann 1998). Herring deposit their transparent eggs on intertidal in Shallow substrate eelgrass and Marine algae although no hearing spawning locations have been documented in the harbor (WDFW 2018), juvenile hearing have been caught during staining just off Ediz Hook (Shaffer and Galuska 2009). Surf smelt are most abundant in the Port Angeles water in late spring through summer but spawn throughout the year, with the heaviest spawn occurring from mid-October through December. Sand lance spawning typically occurs from early November through mid-February. They deposit eggs on a range of nearshore substrates, from soft, pure, fine sand beaches to beaches armored with gravel (Bargmann 1998). Bargmann (1998) indicates that 35 percent of all juvenile salmon diets and 60 percent of the juvenile Chinook diet, in particular, are sand lance. The closest documented sand lance spawning area is a 1,000- foot-long area on the south side of Ediz Hook, a little over one mile from the project site. Adult, juvenile, and larval sand lance are expected to be present within Port Angeles throughout the year.

Water Quality
Water quality in Port Angeles Harbor is generally considered good. While a number of industrial properties historically released effluents into the harbor that may have had negative effects on water quality, the Washington State Department of Ecology (Ecology) and others are actively undertaking cleanup of those properties. Additionally, implementation of the National Pollution Discharge Elimination System has reduced the amount of contamination flowing into the harbor. Ecology's Water Quality Status Report does identify several Category 5 ratings (“polluted waters that require a water improvement project”) in Port Angeles Harbor (Ecology 2018). Water in the western harbor has a Category 5 rating due to low dissolved oxygen (DO) levels, likely due to decaying wood debris in this area. Water in the southern harbor, to the east of the Project has a Category 5 rating due to the occasional presence of enterococcus and fecal coliform bacteria from sewer overflows (Ecology 2018, U.S. Navy 2015). Port Angeles Harbor was listed on the Department of Ecology's 303(d) list of impaired waters for bacterial exceedances in 2012 (Ecology 2018).

Water quality in the harbor is strongly tied to water quality in the Strait of Juan de Fuca. A monthly comparison of water quality parameters (temperature, salinity, DO) indicate that conditions in the harbor closely match conditions of the waters of the greater Strait of Juan de Fuca. Temperatures were slightly higher in the harbor in late summer and salinity inside the harbor was higher during the winter but lower during the fall (Ebbesmeyer et al 1979). Given the proximity to the open ocean and the opportunity for thorough mixing, water quality in the Strait of Juan de Fuca is considered naturally pristine. The difference in temperature between the harbor and the Strait of Juan de Fuca can be attributed to the protection from currents afforded by Ediz Hook, which increases the residence time of water in the harbor. Differences in salinity can be attributed to increased freshwater run-off in the fall due to increased precipitation.

Port Angeles Urban Watersheds

The streams within the Port Angeles urban area include Tumwater Creek, Valley Creek, Peabody Creek, Ennis Creek, and Lees Creek (**Figure 2**). The Port Angeles urban streams have been viewed as “impediments to development” of the urban Port Angeles area. Drainage patterns have been changed, channels have been straightened, numerous road fills and culverts have been placed, etc. Some streams are actively used for sewage disposal and as stormwater conduits.

Figure 2. Aerial photo of salmon inhabited creeks flowing into Port Angeles

The action area has multiple degraded habitat conditions that influence fish presence and carrying capacity. Water quality is good in some locations, but also impaired in others, including poor dissolved oxygen as a result of sediment being intermixed with high amounts of wood waste. Bathymetry and nearshore conditions have been modified by dredging, filling, and structures to aid commercial navigation, which have reduced subaquatic vegetation that provide salmonid cover, and reduced benthic communities that provide salmonid and sturgeon forage. Creeks that flow into the harbor have been impacted by surrounding urban development and fish use of the streams is now limited.

The species and populations most likely to be present as a result are limited to Puget Sound steelhead (Dungeness River summer/winter run, Strait of Juan de Fuca Independent Tributaries winter run, and the Elwha River winter run, and steelhead from Tumwater and Valley Creeks), Hood Canal Summer run chum (from all populations), and Puget Sound Chinook (Dungeness River and Elwha River populations). Effects are also expected to impact southern DPS green sturgeon, eulachon, southern resident killer whales, and humpback whales (no population information). Sunflower sea stars may be present in low numbers and exposed to project effects because this species is well adapted for a wide variety of environmental conditions and habitat types, and can dwell in the low intertidal and subtidal zones to a depth of 435 m (1,427 ft) but are most common at depths less than 25 m (82 ft). In Puget Sound this species relies on clams as a significant source of prey, and in prior years was known to grow much larger than members of the species in other regions (see Lowry et al. 2022).

Effects

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

The biological evaluation provides a detailed discussion and comprehensive assessment of the effects of the proposed action in section 6 of the biological assessment, and is adopted here (50 CFR 402.14(h)(3)). NMFS has evaluated this section and after our independent, science-based evaluation determined it meets our regulatory and scientific standards.

As described in the BA in section 6.1, effects of the proposed construction activity would be short-term, completed within 90 days, within the July 16 to February 15 work window. We anticipate that any project construction impacts (turbidity, pH changes, noise, disturbance from equipment) would be localized, brief, and minor, and would not result in a measurable reduction in habitat quality, or conditions harmful to listed fishes. As described in the BA (section 2), best management practices would be implemented to reduce construction-related effects and marine mammal monitoring while impact driving. Despite minimization efforts the following effects from the presence of structures are also likely to occur. We supplement the BA with the analysis of long term effects (construction effects are described in the BA).

The proposed project is the repair and replacement of overwater, in-water, and nearshore structures. In- and overwater structures and nearshore structures influence habitat functions and processes for the duration of the time they are present in habitat areas. The effects include: (a) altered predator/prey dynamics; (b) disrupted migration; (c) modified shore processes related to bank armoring, and (d) benefits to habitat. These effects are chronic, persistent, and co-extensive with the life of the structure.

Predator/prey dynamics

Overwater structures (OWSs) adversely affect submerged aquatic vegetation (SAV), if present, and inhibit the establishment of SAV where absent, by creating enduringly shaded areas. (Kelty and Bliven 2003). Decreased ambient light typically results in lower overall productivity, which is ultimately reflected in lower shoot density and biomass (Shafer 1999; 2002). In contrast to other studies in the Pacific Northwest, Shafer (2002) specifically considers small residential OWS and states, “much of the research conducted in Puget Sound 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. They reported a statistically significant decline in eelgrass shoot density underneath six of the eleven studied floats in northern Puget Sound. 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.

In addition to reduced SAV biomass and shoot density, shading also has been shown to be correlated with reduced density of the epibenthic forage under OWS's (Haas et al. 2002, Cordell et al. 2017). 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). Eelgrass is a substrate for herring spawning, and herring spawn is Chinook salmon forage species. The likely incremental reduction in epibenthic prey associated with OWS projects will reduce forage for listed fish.

The grating of OWSs limit the effects on predator/prey dynamics. Grating requirements ensure that shading is reduced by allowing some light to penetrate below the OWS. Additionally, skirting and other continuous protective bumper material that may impede light penetration beneath an overwater structure may not extend below the bottom edge of a float frame or pier, further reducing the creation of shade. Conservation offsets are required to compensate for the effects on predator/prey dynamics caused by the repaired/replaced OWSs. The effects of offsets are described in a section below.

Obstructions in migration areas

Juvenile Chinook and juvenile HCSR chum migrate along shallow nearshore habitats, and OWS's will disrupt their migration and increase their predation risk. Some juvenile Juvenile salmon, in both the marine nearshore and in freshwater, migrate along the edge of shadows rather than through them (Nightingale and Simenstad 2001; Southard et al. 2006; Celedonia et al. 2008a; Celedonia et al. 2008b; Moore et al. 2013; Munsch et al. 2014). Overwater structures cause delays in migration for juvenile PS Chinook salmon from disorientation, fish school dispersal (resulting in a loss of refugia), and altered migration routes (Simenstad 1999). Juvenile salmonids stop at the edge of the structures and avoid swimming into their shadow or underneath them (Heiser and Finn 1970; Able et al. 1998; Simenstad 1988; Southard et al. 2006; Toft et al. 2013; Ono 2010). Swimming around structures lengthens the migration distance and is correlated with increased mortality. Anderson et al. (2005) found migratory travel distance rather than travel time or migration velocity has the greatest influence on the survival of juvenile spring Chinook salmon migrating through the Snake River.

In the marine nearshore, there is substantial evidence that OWS impede the nearshore movements of juvenile salmonids and reduced feeding rates for those fish that do utilize OWS (Heiser and Finn 1970; Able et al. 1998; Simenstad 1999; Southard et al. 2006; Toft et al. 2007; Moore et al. 2013, Munsch et al. 2014, see ref). In the Puget Sound 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. Moore et al. (2013) concluded in their study that the Hood Canal Bridge may attract PS steelhead smolts to its shade while also inhibiting passage by disrupting Hood Canal currents. They found this delayed migration, for a species whose juveniles typically migrate rapidly out to the open ocean, likely resulted in steelhead becoming more susceptible to predation by harbor seals and avian predators at the bridge. These findings show that overwater structures can disrupt juvenile salmonid migration in the Puget Sound 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). Elevated pinniped predation rates have been documented at major anthropogenic structures that inhibit movement and cause unnaturally large aggregations of salmonid species (Jeffries and Scordino 1997, Keefer et al. 2012, Moore et al. 2013). The most widely known and intensely studied pinniped/salmonid conflict is California sea lion predation on winter steelhead at the Ballard Locks in Seattle, Washington (Jeffries and Scordino 1997). Although California sea lions first began appearing in the Ballard Locks area on a somewhat regular basis in 1980, their predation on steelhead was not viewed as a resource conflict until 1985, when a significant decline in the wild winter steelhead spawning escapement was noted (Gearin et al. 1996). Subsequent scientific studies documented that sea lions were removing significant numbers of adult steelhead that were returning to the Lake Washington system to spawn (Scordino and Pfeifer 1993).

Another study was conducted by Moore et al. 2013 at the Hood Canal Bridge, a floating structure that extends 3.6 meters underwater and forms a partial barrier for steelhead migrating from Hood Canal to the Pacific Ocean. The authors found more steelhead smolt mortality events occurred within the vicinity of the Hood Canal Bridge than at any other site that was monitored from 2006 through 2010. Smolts that passed by the Hood Canal Bridge receiver array behaved differently than those migrating past similarly spaced receiver arrays inside the Hood Canal, in Puget Sound, and in the Strait of Juan de Fuca. The observed changes in behavior was potentially a result of one or several interacting physical, ecological or environmental factors altered by the bridge structure. Mortalities are likely caused by predation by a marine mammal, inferred from movement patterns recorded on Hood Canal Bridge receivers that would be atypical of surviving steelhead smolts or tags consumed by avian predators (Moore et al. 2013). Longer migration times and paths are likely to result in a higher density of smolts near the bridge in relation to other sites along the migration route, possibly inducing an aggregative predator response to steelhead smolts (Moore et al. 2013).

In summary, NMFS anticipates that the increase in migratory path length from swimming around OWS as well as the increased exposure to piscivorous predators in deeper water likely will result in proportionally increased juvenile PS Chinook salmon and HCSR chum mortality. Except for the Hood Canal Bridge example where the pontoons span roughly 95 percent of the width of the Hood Canal at low tide, PS steelhead do not tend to be nearshore dependent and thus the presence of these structures is unlikely to affect their behavior.

Disrupted Shore Processes
The proposed action includes shoreline modification, including a riprap bulkhead. The effects that these types of structures exert on habitat features and functions also will persist for the same duration. The impacts of hard armor along shorelines are well documented. Armoring of the nearshore can reduce or eliminate shallow water habitats through the disruption of sediment sources and sediment transport. Bulkheads, whether new, repaired, or replacement are expected to result in a higher rate of beach erosion water ward of the armoring from higher wave energy compared to a natural shoreline. This leads to beach lowering, coarsening of substrates, increases in sediment temperature, and decreased SAV, leading to reductions in primary productivity and invertebrate density within the intertidal and nearshore environment (Bilkovic and Roggero 2008; Fresh et al. 2011; Morley et al. 2012; Dethier et al. 2016).

In addition to higher rates of beach erosion and substrate coarsening by increased wave energy, bulkheads would also prevent input of sediment from landward of the bulkhead to the beach, further diminishing the supply of fine sediment. Finer material like gravel and sand provide important spawning substrate for sand lance and surf smelt. Therefore, a reduction to this substrate type within the intertidal and nearshore zone as a result of the bulkhead would reduce potential spawning habitat availability and fecundity of both species (Rice 2006; Parks et al. 2013), which are both important prey species for salmonids. As a result of deepening of the intertidal zone adjacent to the bulkhead, as well as increased wave energy, the repaired, replaced, or new bulkhead would also be expected to reduce SAV (Patrick et al. 2014). This would be expected to cause a reduction in potential spawning habitat (i.e., eelgrass) for Pacific herring, another forage species for salmonids. Another benefit of forage fish abundance to salmonids is their use as a prey buffer for predation by marine mammals and piscivorous birds. Moore et al. (2021) found that the high abundance of age-1+ anchovy in the Puget Sound provided an alternative prey source for predators of outmigrating steelhead smolts which resulted in an increase in smolt survival.

Along with physical loss of habitat, the impacts of nearshore modification include the loss of functions such as filtration of pollutants, floodwater absorption, shading, sediment sources, and nutrient inputs. The greatest impacts to the nearshore are from shoreline armoring; but roads and artificial fill are also significant, and these stressors often occur together or with other modifications (Fresh et al. 2011). Shoreline armoring generally reduces the sediment available for transport by disconnecting the sediment source, e.g. a feeder bluff, from the drift cell, potentially causing loss of beach width and height as transport of material outpaces supply. This can occur at the site of the structure or down the drift cell. Structures in the intertidal zone change the hydrodynamics of the waves washing up on the beach. Hard structures reflect waves without dissipating their energy the way a natural beach would, especially if vegetation is present. This energy can lower the beach, make it steeper, and wash away fine sediments. Dikes and fill reduce estuarine wetlands and other habitat for salmon, forage fish, and eelgrass.

When the physical processes are altered, there is also a shift in the biological communities. The number and types of invertebrates, including shellfish, can change; forage fish lose spawning areas; and juvenile salmon and forage fish lose the feeding grounds that they use as they migrate along the shore (Shipman et al. 2010). Native shellfish and eelgrass have specific substrate requirements and altered geomorphic processes can leave shellfish beds and eelgrass meadows with material that is too coarse or with too much clay exposed. Shoreline armoring can also physically bury forage fish spawning beaches when structures are placed in or too close to the intertidal zone. When shoreline development removes vegetation, the loss of shading and organic material inputs can increase forage fish egg mortality (Penttila 2007). Surf smelt, for example, use about 10 percent of Puget Sound shorelines for spawning and many bulkheads are built in forage fish spawning habitat, threatening their reproductive capacity (Penttila 2007). The effects of nearshore modification cascade through the Salish Sea food web. The consequences can be seen in the population declines of a variety of species that depend on these ecosystems, from shellfish, herring, and salmon to orcas, great blue heron, and eelgrass.

Armoring of the nearshore can reduce or eliminate shallow water habitats via two distinct mechanisms. First, bulkheads cause a higher rate of beach erosion waterward of the armoring because there is higher wave energy, compared to a natural shoreline. As a result of deepening of the intertidal zone adjacent to the bulkhead, as well as increased wave energy, bulkheads also reduce SAV (Patrick et al. 2014). We expect reduced SAV to cause a reduction in potential spawning habitat (i.e., eelgrass) for Pacific herring, another forage species of Chinook salmon and juvenile PS/GB bocaccio. Reduced SAV also diminishes habitat for larval rockfish, which in their pelagic stage rely on SAV for prey and cover for several months. Second, bulkheads located within the intertidal zone (below highest astronomical tide (HAT)) prevent upper intertidal zone and natural upper intertidal shoreline processes such as accumulation of beach wrack (Sobocinski et al. 2010; Dethier et al 2016). This is an additional mechanism that reduces primary productivity within the intertidal zone and diminishes invertebrate populations associated with beach wrack (Sobocinski et al. 2010; Morley et al. 2012; Dethier et al. 2016). Reductions in forage from bulkheads then affect primary productivity and invertebrate abundance in both the intertidal and nearshore environments. Invertebrates are an important food source for juvenile PS Chinook salmon and for forage fish prey species of salmonids.

Shoreline armoring structures are designed to stabilize or “armor” the shoreline, thus it is challenging to incorporate design features that limit the impacts of these structures. In other words, design features that limit the impacts of bulkheads also reduce their effectiveness in shoreline ‘protection’. Therefore, we rely primarily on conservation offsets to compensate for the impacts of structures that modify or armor shorelines. By requiring these offsets, a no-net loss approach to maintaining habitat forming process and nearshore habitat quality is achieved.

There is potential for sunflower sea stars to be within the action area. USCG Project actions, including pile removal and sea floor excavation, may disturb or cause physical harm to individual sunflower sea star if they reside on the piles or substrate. However, BMPs outlined in the BA section 2, including the relocation of sea stars, will be employed to minimize potential adverse short-term impacts associated with removal and replacement of inwater structures such as piles and bank armor, and rubble removal. The primary effect we expect on this species is stress during handling to relocate any individuals.

Benefits to habitat
The proposed action will replace 37 degraded timber piles with steel piles, jacket up to 98 timber piles, and permanently remove 11 abandoned timber piles and 2,500 square feet of rubble removal from the beach. This will remove approximately 75 tons of creosote that creates a long term improvement of water quality and of substrate condition of the habitat. These effects will be incremental but permanent improvements to habitat within the action area. Water and sediment quality improvements from creosote removal will benefit all species considered in this consultation.

The USCG has also included a commitment in its proposed action to addressing debits calculated during this consultation. Debits may be addressed by one, or a combination of, several options, including purchase of credits from a bank or in-lieu fee provider, or habitat restoration actions undertaking directly by the USCG. The USCG will verify all debits are satisfied in coordination with NMFS. These offsets, regardless of option elected, will provide long term habitat improvement for the purpose of retaining overall current function of critical habitat features support for conservation values (e.g., migration, prey resources, shallow refugia, water quality, etc.).

Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Cumulative effects are discussed in BA section 6.3 on page 42 and is incorporated by reference here. These include, but are not limited to several restoration projects slated to occur in the harbor including the Port Angeles Harbor Restoration Program, which would help mitigate some of the ongoing impacts occurring from past and current uses. Continued regional population growth with associated increases in stormwater pollution, ongoing and increasing effects of climate change, and industrial uses in the harbor, are simultaneously likely increase stressors on the regional ecosystem.

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 to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, to formulate the agency’s biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

The species affected by this proposed action are listed as threatened, with the exception of SRKW and the Central America DPS of humpback whales (endangered) and sunflower sea stars (proposed for listing). These are listed because of declines in abundance, poor productivity, and in some cases also due to reduced spatial structure and diminished diversity. Systemic anthropogenic detriments in fresh and marine habitats are limiting the productivity for PS Chinook salmon, PS steelhead, southern DPS green sturgeon, eulachon, SRKW and humpback whales. Hood Canal Summer-run chum, however, has seen notable improvements in freshwater habitat, and, with the contribution of conservation hatchery practices, has improving abundance, productivity, and spatial structure in freshwater areas.

These diminished viability factors are due in part to degraded habitat conditions, including in the action area. The environmental baseline in the action area is a mix of vessel infrastructure as well as commercial development landward of HAT that degrade habitat conditions for listed species in their nearshore marine lifestage. Within the action area there are sources of noise and shade (vessels, piers, etc.), water quality impairments (nonpoint sources), and artificial light (marinas and piers).

To this context of species status and baseline conditions, we add the temporary (noise, turbidity, pH, and general disturbance) and enduring effects (predator/prey dynamics, migration, shore processes, and habitat improvements) of the proposed action, together with cumulative effects (which are anticipated to be future nonpoint sources of water quality impairment associated with development and stressors associated with climate change), in order to determine the effect of the project on the likelihood of species' survival and recovery. We also evaluate if the project's habitat effects will appreciably diminish the value of designated critical habitat for the conservation of the 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.

Critical Habitat

The temporary effects on features of designated critical habitat for PS Chinook salmon, southern DPS green sturgeon, and SRKW will be noise, reduced water quality (each approximately 90 days) and benthic disturbance (recovery from benthic disturbance can take several months post construction, up to 3 years. These adverse effects are limited to a small area around the pier. Additional, enduring, effects on features of designated critical habitat (for PS Chinook salmon, southern DPS green sturgeon), will be benthic disturbance/prey reduction, and structure in the migratory corridor, and for SRKW, an incremental prey reduction via project effects on PS Chinook salmon. The project also includes activities that will improve water quality and substrate condition of the habitat. These beneficial effects will be incremental but permanent improvements to habitat within the action area. These habitat benefits will be supplemented by the USCGs offsetting measures that will be implemented to fully balance the project's habitat debits.

We considered these effects in addition to the baseline and with the influence of cumulative effects and have determined that the habitat reductions are expected to be offset by habitat improvements within 3 years of the construction, and therefore insufficient in scale or duration to appreciably reduce conservation values of the designated critical habitats in the action area that serve the recovery goals for the listed species.

Species

Salmonids. Because the work windows are timed when juvenile salmon migration is largely avoided, and based on general migratory behavior of the listed species, we expect that juvenile PS Chinook salmon will only minimally be exposed to turbidity and sound from construction. The numbers of adult and juvenile Hood Canal summer-run chum and any PS steelhead, and any adult PS Chinook salmon exposed to turbid conditions is also expected to be low. Response among any exposed fish to water quality reductions is avoidance. Noise and turbidity can each put juvenile salmonids at greater risk of predation. This effect is limited to 90 days. Reduced prey will affect the listed fish and may persist for up to 3 years, but these fish are not constrained to the affected area and only a very small number may have reduced fitness as a result of less prey availability. Long term effects on prey and migration are expected to be limited to roughly three years when USCG offsets are in place. And some contemporaneous habitat improvements (water quality from removing or isolating creosote, prey availability from removing rubble) will benefit species in the action area. Thus only 3 cohorts of these species are likely to be adversely affected, and those adverse effects are unlikely to produce an appreciable reduction in fitness or survival of ESA listed salmonids.

Eulachon. The status, timing, and migration routes of eulachon that spawn in the Elwha River are not well-known. There is evidence that spawning is increasing following the removal of the Elwha dams over the past decade. Spawning typically occurs in February to May and may result in large aggregations of Eulachon in the action area. While noise and turbidity can each put small fish like eulachon at greater risk of predation, only a single cohort may experience these effects, and we do not expect significant reduction in fish abundance as a result. The long lasting habitat effects are not expected to result in modified eulachon behaviors as this species does not have nearshore dependency outside of estuaries serving larval lifestages. Any reduction in abundance as a consequence of the proposed action will be insufficient to modify this species' other viability parameters.

Green sturgeon. These fish are wide-ranging migrants, spawning in California and appearing in Washington's coastal waters, estuaries and watersheds in late summer. Although they may be sensitive to hydrological and temperature shifts in their natal watersheds, vulnerability to climate change in Washington is likely linked with changes in the marine environment. Limited information is available regarding the sensitivity of green sturgeon to climate change (particularly in Washington State). The work window is proposed for July 16 to February 15 and green sturgeon are not expected to be present for most of the work being performed. If exposed, green sturgeon are unlikely to be affected by turbidity, and are expected to avoid areas of modified pH and disturbance from operating equipment. Green sturgeon in this location are larger fish, with less vulnerability to pile driving noise. The longer-term habitat changes are not expected to significantly affect green sturgeon, with the exception of reduced prey. We do not expect the additions of these effects to modify green sturgeon abundance.

<u>SRKW.</u> Effects on PS chinook are effects on the prey of SRKW (see above on the synthesis for critical habitat) which may last up to 3 years until the offsets are fully in place. SRKW could experience a slight reduction in prey fitness abundance, however not at a scale that can be measured. We do not expect SRKW to enter the area to be exposed to turbidity, and noise exposure will be brief and not injurious due to monitor and stop work protocols during pile replacement. We do not expect any individual SRKW to have so significant a response to this incremental prey reduction that survival or fecundity will be affected.

<u>Humpbacks</u>. Individuals from CAM and MEX DPSs are expected only to be exposed to noise and as above with SRKW exposure will be brief and non-injurious based on monitor and stop work protocols of the proposed action

<u>Sunflower sea stars.</u> The proposed action includes careful handling to remove any of this species from structures or rubble that will be removed or replaced. Handling could stress the individual but we do not expect injury or death as a consequence. The habitat effects will also be experienced by any sunflower sea stars in the action area, though given current abundance this number is expected to be very low. NMFS is not aware that sound produces a negative response in sea stars. Sea stars are highly mobile (relative to other sea star species) and are expected to migrate away from areas where benthic prey is reduced, consistent with their typical foraging behavior. If they are coated by suspended sediment settling out, we expect this species will not be smothered but will move out of the affected area. Water quality improvements and reduced exposure to creosote is expected to be beneficial to this species. We do not anticipate a reduction in abundance of this species as a result of the proposed action

When considered with the environmental baseline in the action area and cumulative effects, the action, as proposed, does not increase risk to the affected populations to a level that would appreciably reduce the likelihood for survival and recovery of the PS Chinook salmon, PS steelhead, Hood Canal summer-run chum salmon, green sturgeon southern DPS, eulachon, SRKW, or humpback whale (either the Central America or Mexico DPS) or sunflower sea stars.

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, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of:

1. PS Chinook salmon
2. PS steelhead
3. Hood Canal summer run chum
4. Eulachon
5. Green sturgeon
6. Southern resident killer whale

7. Humpback whale
8. Sunflower sea star

Or destroy or adversely modify designated critical habitat of:

1. PS Chinook
2. Green sturgeon
3. Southern resident killer whale

Incidental Take Statement

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

Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Harm or Harassment from water quality reductions

Juvenile salmon and steelhead, eulachon, green sturgeon, and sunflower sea stars would be harmed by exposure to, or harassed by, increased turbidity and decreased dissolved oxygen. Exclusion from preferred habitat areas causes increased energy use and an increased likelihood of predation, competition and disease that is reasonably certain to result in injury or death of some individual fish. The extent of take harm and harassment sediment disturbing activities is a 300-foot buffer from the point of suspended sediment generation for up to 90 days.

Harm, Harassment, Injury or Death from pile driving

Installation or removal of piles will cause underwater sound during vibratory installation and impact proofing sufficient to harm or harass each listed fish species, or to injure or kill juvenile PS chinook, or eulachon.

The implementation of marine mammal monitoring plan with stop work provisions will ensure no incidental take of SRKWs and humpback whales from pile driving or removal.

NMFS cannot estimate the number of fish harmed, harassed, injured, or killed by pile driving or removal because fish presence at the project site vary depending on time of year, water temperature, forage distribution and many other factors. Additionally, there are limited ways to count or observe the number of fish exposed to the adverse effects of pile driving without causing additional risk of injury or harassment. The extend of take is therefore based on the number of piles driven for the project is a valid indicator of the amount of incidental take caused by pile driving. The number of piles driven is proportional to the amount of take because each pile driven creates sound that could harass, injure, or kill fish. The risk and total number of fish likely to be exposed as more piles are driven. The project number of piles expected to be driven for this project is: 149 removed, 135 installed (replaced). Of the piles removed and installed a 37 will be steel, the remainder will be wood or jacketed wood.

Harm from shoreline and nearshore modification

Juvenile PS Chinook and HCSR chum rely on shallow nearshore areas. We cannot estimate the number of fish exposed to shoreline and nearshore anthropogenic structure over the life of these structures, so we identify the extent of take as the footprint of these structures The extent of harm from shore armor is 372 feet of shoreline armorin. This extent is causally related to harm of juvenile salmonids because shoreline armoring restricts natural beach forming processes (natural erosive processes) by disrupting the supply and replenishment of sediment sources that are the base of forage fish spawning habitat.

This extent also serves as a surrogate for SRKW because as forage fish reproduction is restricted or reduced, so is the availability of food for listed fish (salmon and steelhead) which are prey of SRKW. Limiting and reducing the numbers of listed fish that the action area can support. In turn, this limits the number of juvenile PS Chinook salmon that will survive and return to the local streams as adults that supply prey for SRKW.

Harm from in-water and over-water structures

In and overwater structures impair migration and forage-base of juvenile salmonids. We cannot estimate the number of these fish exposed to the structures over their lifetime, so we identify the extent of take as the footprint of these structures. This metric is causal because the likelihood of avoidance and the distance required to swim around the structure (migration delay) would both increase as the size of a structure and the intensity of its shadow increase, which would increase the number of juveniles that enter deeper water where forage efficiency would be reduced and vulnerability to predators would be increased. The amount of overwater structure directly determines the amount of shaded area, migration obstruction, reduced benthic productivity and SAV distrusting and limiting feeding opportunities available at the project sites. The extent of these impacts would increase and decrease depending directly on structure size. The extent is 10,774 square feet (total).

Capture

The handling and relocation of sunflower sea stars, while intended as a measure to safeguard this species from exposure to other project effects, is considered ‘capture’ a form of take under the ESA. NMFS estimates that fewer than 10 individuals would be handled for relocation during the course of this project.

Effect of the Take

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

Reasonable and Prudent Measures

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

1. Monitor the construction for the proposed action to ensure that it conforms to all design specifications, and implements best management practices.
2. Develop and implement a final plan to offset project impacts.
3. Document any sunflower sea stars that are captured and relocated.

Terms and Conditions

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

1. The following terms and conditions implement reasonable and prudent measure 1 (monitoring construction and design):
    a. The applicant must report to projectreports.wcr@noaa.gov within 60 days of project completion, as-built documentation of the proposed structures to demonstrate that the footprint and the length of the structures does not exceed the proposed design.
    b. Verification (photo or other reporting) that all proposed BMPs and conservation measures were implemented, including marine mammal monitoring reports.

2. The following terms and conditions implement reasonable and prudent measure 2 (plan to offset debits):
    a. The USCG will continue to work with NMFS to offset project impacts by:
        i. Finalizing an agreement with NMFS and/or an approved bank or in-lieu fee program before the start of construction; and,
        ii. Purchasing credits within 3 years of the start of construction.

3. The following terms and conditions implement reasonable and prudent measure 3 (sunflower sea star handling):
    a. If any sunflower sea stars require relocation, take all care to handle gently and slowly disengage it from the structure; do not remove the specimen from water.

b. Report to NMFS within 5 days, the size of handled specimens (in inches) and provide if possible a description of the general condition. Indicate detail about the location prior to removal (e.g., on pile, on bank armor, on rubble) and describe the general relocation area.

Conservation Recommendations:

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

The USCG should develop a mitigation program within Puget Sound.

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

Reinitiation of Consultation

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

ESSENTIAL FISH HABITAT

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was conducted pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

EFH impacted include: Pacific coast groundfish, coastal pelagic species, and Pacific coast salmon.

Alterations to the nearshore light, wave energy, and substrate regimes affect the nature of EFH and nearshore food webs that are important to a wide variety of marine finfish and shellfish (Armstrong et al.1987, Beale 2018; Burdick and Short 1999, Cardwell and Koons 1981, Kenworthy and Haunert 1991, Olson et al. 1996, Parametrix and Battelle 1996, Penttila and Doty 1990, Shafer 1999; Simenstad et al. 1979, 1988, Thom and Shreffler 1996, Weitkamp 1991).

The effects of the proposed action on ESA-listed species are described in Effects section of the ESA analysis above and in sections 6 and 8 of the BA. The same mechanisms of effect are likely to affect all Pacific Coast groundfish, coastal pelagic species, and Pacific Coast salmon to varying degrees. Some additional adverse effects include:

1. Water quality – both temporary (during construction) and permanent. Examples include sound and turbidity. Additionally, copper-based paints are frequently used on vessel hulls in marine environments as an antifouling agent. These pesticidal paints slowly leach copper from the hull in order to deter attachment of fouling species, which may slow boats and increase fuel consumption. Copper that is leached into the marine environment does not break down and may accumulate in aquatic organisms, particularly in systems with poor tidal flushing. At low concentrations, metals such as copper may inhibit development and reproduction of marine organisms, and at high concentrations they can directly contaminate and kill fish and invertebrates. In coho salmon, low levels of copper have been shown to cause olfactory impairment, affecting their predator avoidance and survival (McIntyre 2012). These metals have been found to adversely impact phytoplankton (NEFMC 1998), larval development in haddock, and reduced hatch rates in winter flounder (Bodammer 1981, Klein-MacPhee et al. 1984). Other animals can acquire elevated levels of copper indirectly through trophic transfer, and may exhibit toxic effects at the cellular level (DNA damage), tissue level (pathology), organism level (reduced growth, altered behavior and mortality), and community level (reduced abundance, reduced species richness, and reduced diversity) (Weis et al. 1998, Weis and Weis 2004, Eisler 2000).

2. Forage reduction – disturbance and shading of SAV can result in reduction in SAV density and abundance, and related primary production. Designated EFH will experience temporary, episodic, and enduring declines in forage or prey communities. Whitney and Darley (1983) found that microalgal communities in shaded areas are generally less productive than unshaded areas, with productivity positively correlated with ambient irradiance. Stutes et al. (2006) found a significant effect of shading on both sediment primary production and metabolism (i.e. sediment respiration). Intertidal salt marsh plants are also impacted by shading: the density of Spartina alterniflora was significantly lower under docks than adjacent to docks in South Carolina estuaries, with stem densities decreased by 71 percent (Sanger et al. 2004). Kearny et al. (1983) found the S. alterniflora was completely shaded out under docks that were less than 40 cm high and that the elimination of the macrophytic communities under the docks ultimately led to increased sediment erosion. Thom et al. (2008) evaluated the effects of short- and long-term reductions in submarine light reaching eelgrass in the Pacific Northwest, especially related to turbidity and overwater structures. They found that lower light levels may result in larger and less dense plants and provided light requirements for the protection and restoration of eelgrass.

Reductions in benthic primary productivity may in turn adversely affect invertebrate distribution patterns. For example, Struck et al. (2004) observed invertebrate densities under bridges at 25-52 percent of those observed at adjacent unshaded sites. These results were found to be correlated with diminished macrophyte biomass, a direct result of increased shading. Overwater structures that attenuate light may adversely affect estuarine marsh food webs by reducing macrophyte growth, soil organic carbon, and altering the density and diversity of benthic invertebrates (Whitcraft and Levin 2007). Reductions in primary and invertebrate productivity may additionally limit available prey resources to federally managed fish species and other important commercial and recreational species. Prey resource limitations likely impact movement patterns and the survival of many juvenile fish species. Adverse impacts to estuarine productivity may, therefore, have effects that cascade through the nearshore food web.

Fishes rely on visual cues for spatial orientation, prey capture, schooling, predator avoidance, and migration. Juvenile and larval fish are primarily visual feeders with starvation being the major cause of larval mortality in marine fish populations. Survival at early life history stages is often critical in determining recruitment and survival at subsequent life stages, with survival linked to the ability to locate and capture prey and to avoid predation (Britt 2001). The reduced light conditions found under overwater structures limit the ability of fishes, especially juveniles and larvae, to perform these essential activities. For example, Able et al. (1999) found that caged fish under piers had growth rates similar to those held in a laboratory setting without food. In contrast, growth rates of fish caged in pile fields and open water were significantly higher. Able et al. (1998) also demonstrated that juvenile fish abundance and species richness was significantly lower under piers in an urban estuary. Although some visual predators may use alternative modes of perception, feeding rates sufficient for growth in dark areas usually demand high prey concentrations and encounter rates (Grecay and Targett 1996). As coastal development and overwater structure expansion continues, the underwater light environment will continue to degrade, resulting in adverse effects to EFH and nearshore ecosystems.

3. Migration and passage - Designated salmon EFH will experience enduring incremental diminishment of safe migration. As mentioned above, in the marine nearshore, there is substantial evidence that OWS impede the nearshore movements of juvenile salmonids.

4. Shoreline armoring projects will reduce available nearshore habitat - Reduction in quality of nearshore habitat through removal of riparian vegetation and resulting reduction of allochthonous input to the nearshore. Armoring also degrades sediment conditions, forage base, and access to shallow water waterward of the structures. Furthermore, access to forage and shallow water habitat upland of the structures is prevented during high tides.

EFH Conservation Recommendations

Habitat Enhancement: The USCG should or work with NMFS to identify and implement nearshore habitat enhancement and restoration activities in the Port Angeles Harbor that:

1. Improve the quality of riparian habitat to increase overwater cover and forage for juvenile migration and rearing; and
2. Remove old in-water structures such as docks, piles and bulkheads that are no longer in use.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described previously, designated EFH for Pacific Coast salmon.

As required by section 305(b)(4)(B) of the MSA, USCG must provide a detailed response in writing to NMFS within 30 days after receiving an EFH conservation recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH conservation recommendations unless NMFS and the federal agency have agreed to use alternative time frames for the federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH.

In the case of a response that is inconsistent with the conservation recommendations, the federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

This letter underwent pre-dissemination review 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). The biological opinion will be available through NOAA Institutional Repository https://repository.library.noaa.gov/. A complete record of this consultation is on file at the Oregon Washington Coastal Office in Lacey, Washington.

Please contact Lisa Abernathy at lisa.abernathy@noaa.gov if you have any questions concerning this consultation, or if you require additional information

Sincerely,

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

cc: Karen Ladd

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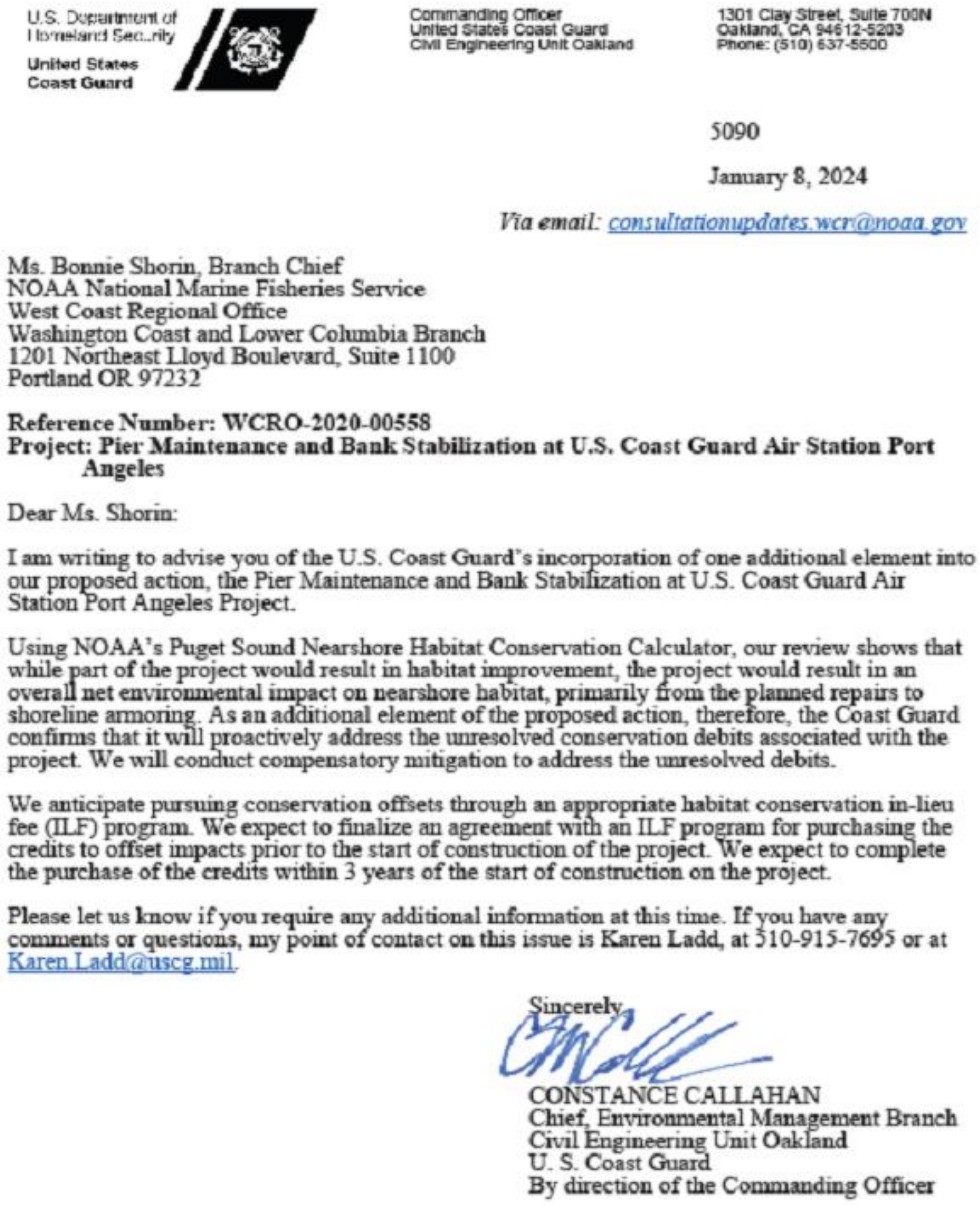
APPENDIX A



U.S. Department of
Homeland Security

United States
Coast Guard

Commanding Officer
United States Coast Guard
Civil Engineering Unit Oakland

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Oakland, CA 94612-5203
Phone: (510) 637-5500

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January 8, 2024

Via email: consultationupdates.wcr@noaa.gov

Ms. Bonnie Shorin, Branch Chief
NOAA National Marine Fisheries Service
West Coast Regional Office
Washington Coast and Lower Columbia Branch
1201 Northeast Lloyd Boulevard, Suite 1100
Portland OR 97232

Reference Number: WCRO-2020-00558
Project: Pier Maintenance and Bank Stabilization at U.S. Coast Guard Air Station Port Angeles

Dear Ms. Shorin:

I am writing to advise you of the U.S. Coast Guard's incorporation of one additional element into our proposed action, the Pier Maintenance and Bank Stabilization at U.S. Coast Guard Air Station Port Angeles Project.

Using NOAA's Puget Sound Nearshore Habitat Conservation Calculator, our review shows that while part of the project would result in habitat improvement, the project would result in an overall net environmental impact on nearshore habitat, primarily from the planned repairs to shoreline armoring. As an additional element of the proposed action, therefore, the Coast Guard confirms that it will proactively address the unresolved conservation debits associated with the project. We will conduct compensatory mitigation to address the unresolved debits.

We anticipate pursuing conservation offsets through an appropriate habitat conservation in-lieu fee (ILF) program. We expect to finalize an agreement with an ILF program for purchasing the credits to offset impacts prior to the start of construction of the project. We expect to complete the purchase of the credits within 3 years of the start of construction on the project.

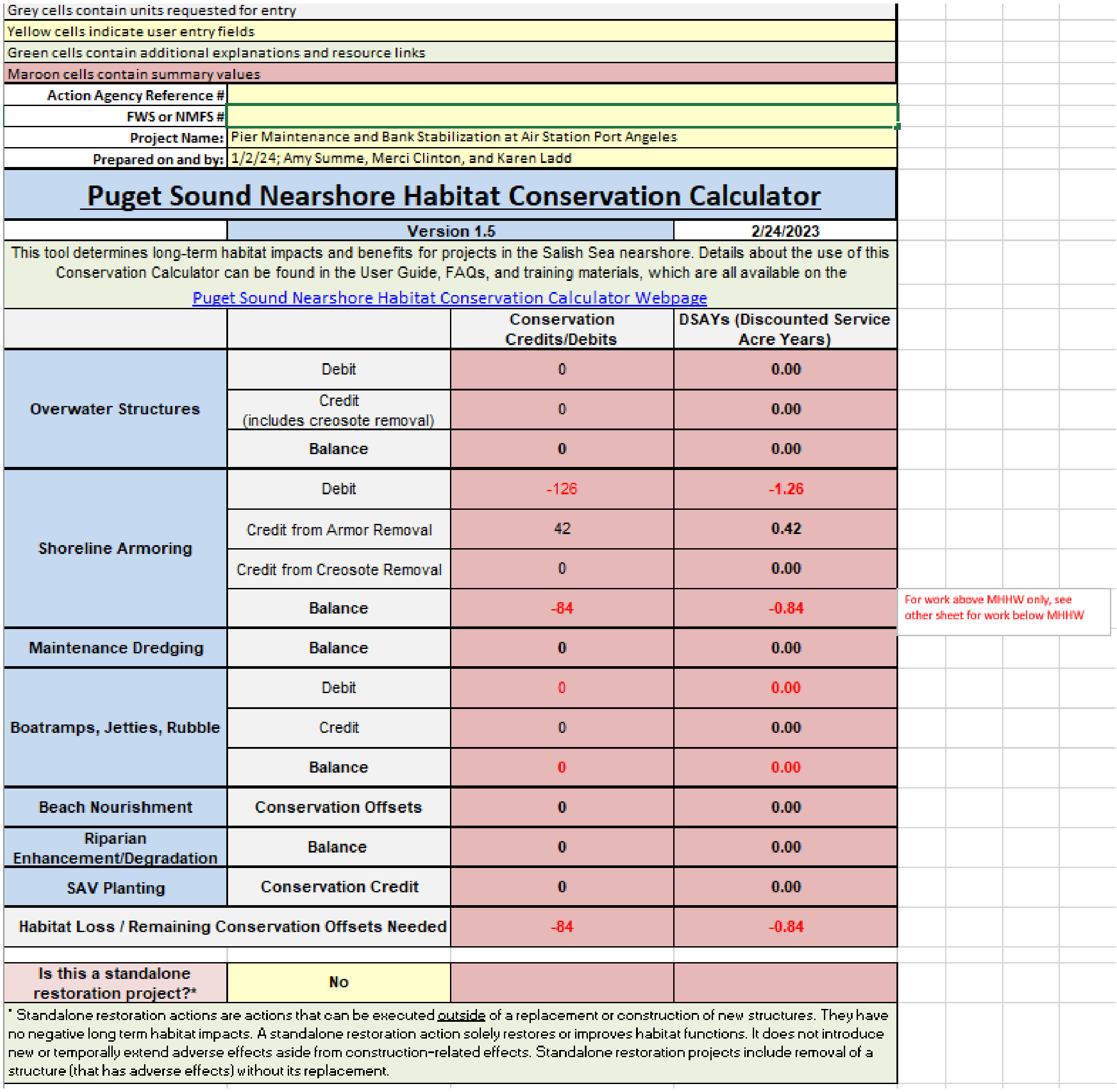
Please let us know if you require any additional information at this time. If you have any comments or questions, my point of contact on this issue is Karen Ladd, at 510-915-7695 or at Karen.Ladd@uscg.mil.

Sincerely,

CONSTANCE CALLAHAN
Chief, Environmental Management Branch
Civil Engineering Unit Oakland
U. S. Coast Guard
By direction of the Commanding Officer

APPENDIX B

Calculator 1 of 2, summary page: -84 debits



Grey cells contain units requested for entry

Yellow cells indicate user entry fields

Green cells contain additional explanations and resource links

Maroon cells contain summary values

Action Agency Reference #	
FWS or NMFS #	
Project Name:	Pier Maintenance and Bank Stabilization at Air Station Port Angeles
Prepared on and by:	1/2/24; Amy Summe, Merci Clinton, and Karen Ladd

Puget Sound Nearshore Habitat Conservation Calculator

Version 1.5 2/24/2023

This tool determines long-term habitat impacts and benefits for projects in the Salish Sea nearshore. Details about the use of this Conservation Calculator can be found in the User Guide, FAQs, and training materials, which are all available on the

Puget Sound Nearshore Habitat Conservation Calculator Webpage

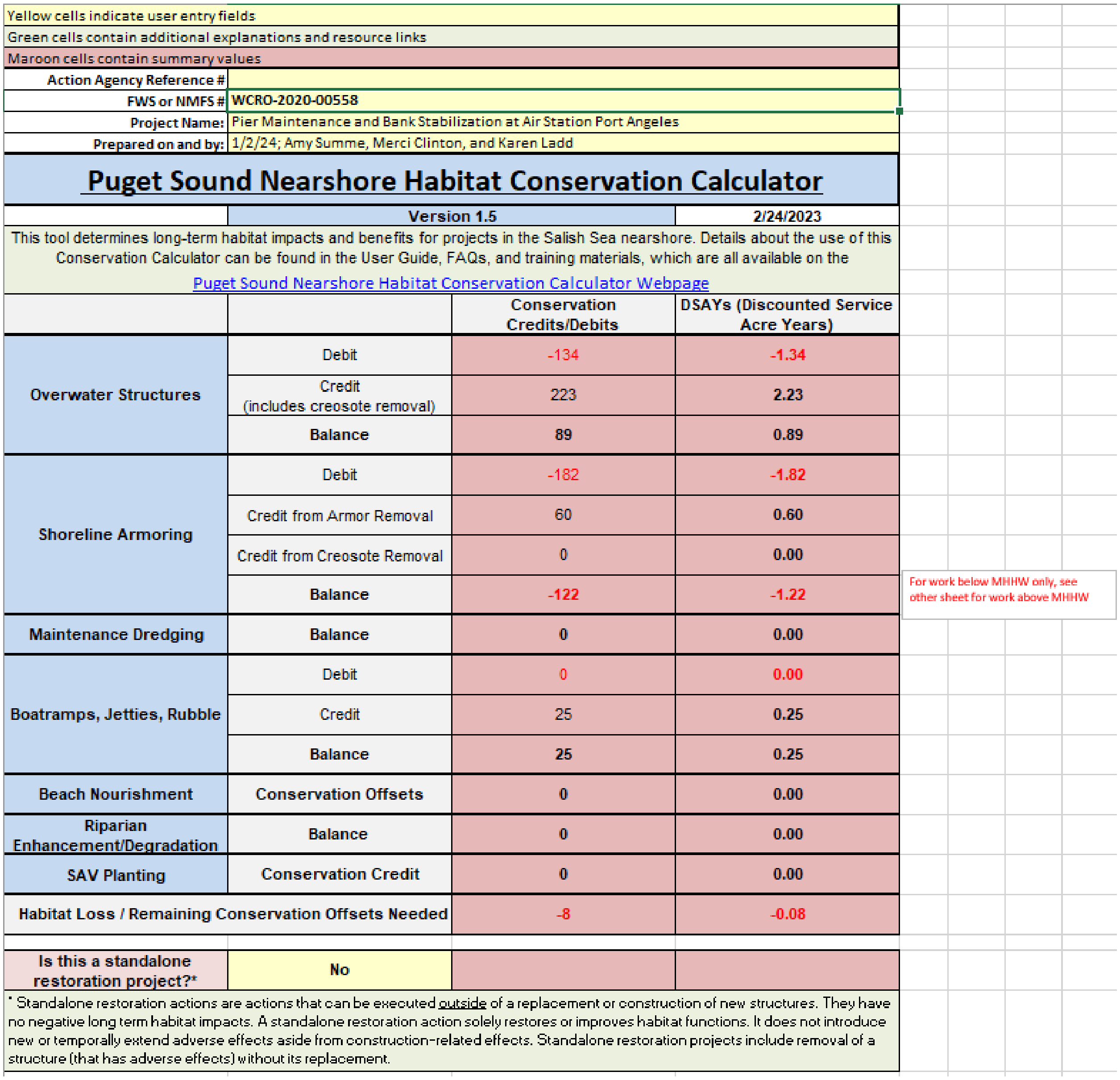
		Conservation Credits/Debits	**DSAYs (Discounted Service Acre Years)**
Overwater Structures	Debit	0	**0.00**
	Credit (includes creosote removal)	0	**0.00**
	Balance	**0**	**0.00**
Shoreline Armoring	Debit	-126	**-1.26**
	Credit from Armor Removal	42	**0.42**
	Credit from Creosote Removal	0	**0.00**
	Balance	**-84**	**-0.84**
Maintenance Dredging	**Balance**	**0**	**0.00**
Boatramps, Jetties, Rubble	Debit	0	**0.00**
	Credit	0	**0.00**
	Balance	**0**	**0.00**
Beach Nourishment	**Conservation Offsets**	**0**	**0.00**
Riparian Enhancement/Degradation	**Balance**	**0**	**0.00**
SAV Planting	**Conservation Credit**	**0**	**0.00**
Habitat Loss / Remaining Conservation Offsets Needed		**-84**	**-0.84**

For work above MHHW only, see other sheet for work below MHHW

Is this a standalone restoration project?*	**No**

* Standalone restoration actions are actions that can be executed outside of a replacement or construction of new structures. They have no negative long term habitat impacts. A standalone restoration action solely restores or improves habitat functions. It does not introduce new or temporally extend adverse effects aside from construction-related effects. Standalone restoration projects include removal of a structure (that has adverse effects) without its replacement.

Calculator 2 of 2, summary page: -8 debits
Total debits of calculators 1 and 2: -92 debits



Yellow cells indicate user entry fields
Green cells contain additional explanations and resource links
Maroon cells contain summary values

Action Agency Reference #	
FWS or NMFS #	WCRO-2020-00558
Project Name:	Pier Maintenance and Bank Stabilization at Air Station Port Angeles
Prepared on and by:	1/2/24; Amy Summe, Merci Clinton, and Karen Ladd

Puget Sound Nearshore Habitat Conservation Calculator

Version 1.5 **2/24/2023**

This tool determines long-term habitat impacts and benefits for projects in the Salish Sea nearshore. Details about the use of this Conservation Calculator can be found in the User Guide, FAQs, and training materials, which are all available on the
Puget Sound Nearshore Habitat Conservation Calculator Webpage

		Conservation Credits/Debits	DSAYs (Discounted Service Acre Years)
Overwater Structures	Debit	-134	-1.34
	Credit (includes creosote removal)	223	2.23
	Balance	**89**	**0.89**
Shoreline Armoring	Debit	-182	-1.82
	Credit from Armor Removal	60	0.60
	Credit from Creosote Removal	0	0.00
	Balance	**-122**	**-1.22**
Maintenance Dredging	**Balance**	**0**	**0.00**
Boatramps, Jetties, Rubble	Debit	0	0.00
	Credit	25	0.25
	Balance	**25**	**0.25**
Beach Nourishment	**Conservation Offsets**	**0**	**0.00**
Riparian Enhancement/Degradation	**Balance**	**0**	**0.00**
SAV Planting	**Conservation Credit**	**0**	**0.00**
Habitat Loss / Remaining Conservation Offsets Needed		**-8**	**-0.08**
Is this a standalone restoration project?*	**No**		

For work below MHHW only, see other sheet for work above MHHW

* Standalone restoration actions are actions that can be executed outside of a replacement or construction of new structures. They have no negative long term habitat impacts. A standalone restoration action solely restores or improves habitat functions. It does not introduce new or temporally extend adverse effects aside from construction-related effects. Standalone restoration projects include removal of a structure (that has adverse effects) without its replacement.