UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No.:
WCRO-2023-03486

April 12, 2024

Michael Villnave
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FHWA Washington Division
310 Maple Park Avenue SE
Olympia, Washington 98504

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, Section 7(a)(4) Conference Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Port of Everett SR 529 West Marine View Drive Bulkhead Replacement and Wharf Improvements Project

Dear Mr. Villnave:

This letter responds to your March 25, 2024, 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 Federal Highway Administration (FHWA) 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.

We adopt by reference here:

- Pages 3-9 of the Biological Assessment (BA) for the proposed action and timeline of project activities,
- Pages 9 and 10 of the BA for the best management practices (BMPs) that will be utilized to minimize project impacts,
- Pages 11-13 of the BA for the action area,
- Pages 14-20 of the BA for the status of ESA-listed species and their designated critical habitat affected by the proposed action,
- Pages 21-24 of the BA for the environmental baseline of the action area,
- Pages 25-31 and 34-38 of the BA for the effects of the proposed action on ESA-listed species and their designated critical habitat,
- Pages 32 and 33 of the BA for the analysis of cumulative effects on ESA-listed species and their designated critical habitat, and
- Appendix E of the BA for the Essential Fish Habitat assessment.

Per 50 CFR § 402.10, we have also completed a conference opinion (ESA Section 7(a)(4)) evaluating the effects of the proposed program of activities on sunflower sea stars (*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".

We note where we have supplemented information in the BA with our own data analysis. The BA will be included in the administrative record for this consultation and we will send it to readers of the biological opinion as an email reply attachment to requests sent to bonnie.shorin@noaa.gov.

On March 1, 2023, NMFS and the applicant met to discuss the permitting pathway and possible mitigation options for the project. The applicant asked if the project would potentially be eligible for consultation under the Salish Sea Nearshore Programmatic (SSNP) and NMFS advised that since FHWA is the federal action agency, the project would proceed under individual consultation.

On June 16, 2023, NMFS and the applicant met to continue the conversation of potential mitigation projects that could sufficiently offset the project impacts. The applicant also informed NMFS that the consultation request would be coming from the Washington State Department of Transportation (WSDOT) Local Programs Division, as they are FHWA's designated representative.

On October 3, 2023, the applicant met with NMFS and the U.S. Army Corps of Engineers (USACE) to discuss their chosen method of mitigation and possible funding considerations. NMFS and USACE both agreed that the proposal would satisfy their agencies' requirements and the applicant began finalizing their submittal.

On March 25, 2024, the FHWA sent NMFS the BA and a formal consultation request. On March 27, 20924, the FHWA requested that a conference opinion for sunflower sea star also be included in the consultation. On March 27, 2024, NFMS initiated formal consultation.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the

[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

2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

Proposed Action

Per BA pages 3 through 9, the FHWA proposes to provide funding to the Port of Everett (Port) for the replacement of their Segment E bulkhead and improve the associated wharf in the northeast corner of the South Marina in the 1600 Block of State Route (SR) 529 (West Marine View Drive). The existing creosote bulkhead is over 50 years old and is at risk of failure due to its poor condition, which could threaten the integrity and operation of SR 529 immediately upland of bulkhead Segment E. Once the new sheetpile bulkhead has been installed, the Project also proposes to improve existing public access by constructing a new wharf on top of the structure and adjusting the existing gangway at the north end of Segment E. The Port proposes to complete in-water work between July 16 of 2024 and February 15 of 2025 with overwater work continuing into the spring of 2025 pending receipt of all necessary permits.

The existing creosote wharf above Segment E (5,160 square feet [SF]) and its 75 piles (12 inches in diameter) would be removed with a combination of both barge- and land-based cranes using vibratory pile drivers, land-based excavators, and other associated equipment. The new bulkhead would be installed by driving 87 Z-sheet piles approximately 10 feet (ft.) waterward of the existing lower bulkhead wall, isolating the existing creosote bulkheads from Port Gardner. Once the entire bulkhead is constructed, backfill material would be placed between the new and existing bulkheads and a wharf would be constructed on top of the filled area. The new wharf would consist of 13 steel pipe piles (24 inches in diameter), 20 fender piles (12 inches in diameter), steel pile caps, timber stringers, and an Ammoniacal Copper Zinc Arsenate (ACZA) treated timber deck (3,560 SF of overwater coverage). The sheetpile bulkhead and all piles would initially be installed using a vibratory driver and would be "proofed" with an impact driver to complete installation. The Port estimates that this construction would require 28 days of vibratory driving and 14 days of impact driving with some overlap in driving activities for a total of 42 days of driving work. On average, 16 Z-sheet piles, 4 piles (using vibratory driving), or 2 piles (using impact driving) would be installed daily.

The bulkhead replacement would result in a loss of 2,770 SF of aquatic habitat and a 1,460 SF increase in overwater coverage. In addition to the removal and isolation of creosote from marine waters, the Port proposes to remove a derelict vessel with dimensions of 60 ft. by 60 ft. and 10 ft. tall from the Snohomish River Estuary to offset the unavoidable adverse effects (both temporary and permanent) of the action. The creosote and steel vessel is currently grounded at +5 Mean Lower Low Water (MLLW) elevation in the intertidal mudflat near the Baywood Industrial, LLC property and has been embedded within the estuary for at least 30 years. The Port is seeking to defray the costs of vessel removal by applying for a grant from the Washington Department of Natural Resources (WDNR) to partially fund this removal. While the amount of the grant has yet to be determined, the Port has committed to funding a minimum of 20% of the vessel removal cost. As such, NMFS is considering 20% of this vessel removal as compensatory mitigation for the proposed action. Our analysis of whether the proposed mitigation would fully offset the

Project impacts considers the benefits of 720 SF (20%) of derelict vessel removal rather than the vessel's full size (3,600 SF).

Due to the complexity of the mitigation site, the Port has outlined three possible scenarios for vessel removal. Option 1 would involve accessing the vessel via land and constructing a temporary fill ramp down the steep existing slope to provide equipment access to the beach. Mats would then be placed on the tidal substrate to facilitate equipment access, the vessel would be disassembled or cut into pieces, and removed via the ramp and mats. This option would minimize substrate impacts within the estuary, though it would temporarily damage estuarine vegetation. Option 2A would involve accessing the vessel via water and would require a crane barge and materials barge to ground out within the estuary to accommodate vessel removal at low tide and in the dry. The Port's engineers anticipate that these barges together would be 60 ft. by 100 ft. in size (6,000 SF) but have stated that the barges could be as large as 7,500 SF total (with dimensions of either 120 ft. by 60 ft. or 140 ft. by 55 ft.). The contractor would attempt to remove the vessel in a single event or break the vessel into manageable pieces that could be handled by the contractor's equipment. Similarly, Option 2B would also involve the use of a crane barge and materials barge to access the vessel but would perform work during high tide over the course of one to two days to prevent the barges from grounding out. The derelict vessel may need to be floated out to deeper waters and removed either in a single piece or broken into sections to facilitate removal.

The FHWA summarized project BMPs and conservation measures to reduce the reasonably certain adverse effects of the action in BA pages 9 and 10. BMPs address and minimize several of the incidental take pathways to ESA-listed salmon, steelhead, and SRKW, including the use of a bubble curtain during impact pile driving to minimize exposure to underwater noise. The BMPs also include the implementation of a floating turbidity curtain, a marine mammal monitoring plan, and procedures to minimize the risk of leaks, spills, or other contaminants entering the waterway.

As the proposed action is within the Puget Sound, NMFS considered evaluating the Project using a Habitat Equivalency Analysis (HEA)[2] and the Puget Sound Nearshore Habitat Values Model (NHVM) adapted from Ehinger et al. 2015. Ecological equivalency that forms the basis of HEA is a concept that uses a common currency to express and assign a value to functional habitat loss and gain. Ecological equivalency is traditionally a service-to-service approach where the ecological functions and services for a species or group of species lost from an impacting activity are fully offset by the services gained from a conservation activity. When analyzing the Project activities, NMFS determined that the NHVM in its current version was not the best tool to evaluate all of the project activities. This is due to a variety of factors, including the Project

[2] A common "habitat currency" to quantify habitat impacts or gains can be calculated using Habitat Equivalency Analysis (HEA) methodology when used with a tool to consistently determine the habitat value of the affected area before and after impact. NMFS selected HEA as a means to identify section 7 project related habitat losses, gains, and quantify appropriate mitigation because of its long use by NOAA in natural resource damage assessment to scale compensatory restoration (Dunford et al. 2004; Thur 2006) and extensive independent literature on the model (Milon and Dodge 2001; Cacela et al. 2005; Strange et al. 2002). In Washington State, NMFS has also expanded the use of HEA to calculate conservation credits available from fish conservation banks (NMFS 2008, NMFS 2015), from which "withdrawals" can be made to address mitigation for adverse impacts to ESA species and their designated CH.

elements (shoreline armoring) that cannot be comprehensively assessed within the Project setting (highly modified estuarine system). Therefore, NMFS evaluated the long-term effects of the bulkhead replacement, as well as the derelict vessel removal, qualitatively in the Effects of the Action section below. NMFS determined that the functional enhancement provided by the derelict vessel removal and removal and isolation of approximately 87 tons of creosote from marine waters would sufficiently offset the Project impacts, resulting in no-net-loss of ecological functions. Appendix A includes summary sheets depicting the Project elements that have been entered into the Puget Sound Nearshore Conservation Calculator (creosote removal and replacement of overwater coverage).

Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The BA describes the action area on pages 11 through 13. The BA determined that the maximum extent of effects from the proposed action is the radial distance from Bulkhead Segment E to a point where sound from vibratory and impact pile driving attenuates to background levels (0.07 mile for underwater noise and 607 meters, or 0.38 mile for in-air noise). Likewise, noise from the derelict vessel removal site would attenuate to background levels within 250 ft. in air from the noise source, and turbidity from the vessel removal would extend 150 ft. from the action (Figure 1). NMFS determined that the action area also encompasses the pathway that the crane and materials barges may travel to access and remove the derelict vessel via the Federal Navigation Channel. As the contractor could be floating the barges to the project site from any location, it is not possible to definitively determine its pathway. However, we can more confidently predict the barges' impacts and pathway once they enter Possession Sound and travel up Port Gardner to the mitigation site. Therefore, we have determined that the maximum extent of effects from the proposed action is approximately two miles off shore into Possession Sound, as this area encompasses the majority of effects caused by the barges. Outside of this two-mile zone, the location of the barges is variable to the degree that an analysis of its co-occurrence with listed species is speculative.

Figure 1. Extent of Project Noise and Turbidity from BA (Figure 2, pg. 13)

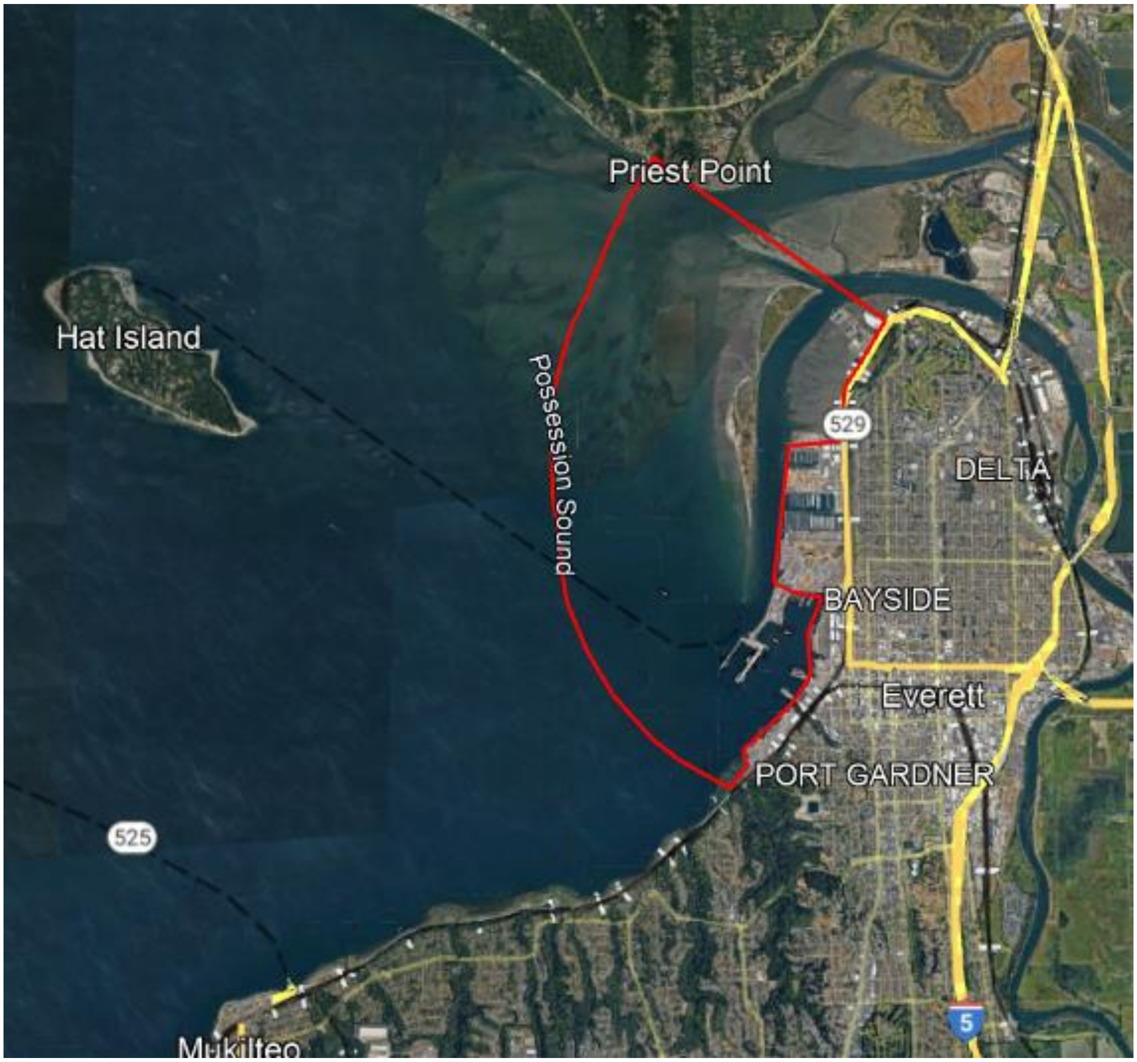

Figure 2. Project Action Area (2 miles offshore)

Status of the 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.

The BA summarizes the status of Puget Sound (PS) Chinook salmon on pages 15 and 16. The BA summarizes the approximate timing and abundance of PS Chinook salmon use of the Snohomish River system and its estuary, noting that PS Chinook salmon occupy the Snohomish River Estuary between February and November, with peak abundance occurring between April and July corresponding with outmigrating juveniles. We supplement this information with our understanding that PS Chinook salmon abundance within the action area (the mainstem Snohomish River) appears to increase and decrease more sharply than within Steamboat and

Union Sloughs, indicating that juvenile Chinook salmon are likely utilizing the action area as their primary migratory pathway through the estuary rather than for rearing purposes (Chamberlin et al 2022). NMFS agrees with the BA conclusion that the marina surrounding Bulkhead Segment E is unlikely to support rearing habitat due to extensive shoreline armoring, significant recreational boat traffic, and lack of natural cover. Nevertheless, we expect that portions of the action area, including the intertidal mudflat and the shoreline of Jetty Island, do provide limited rearing habitat for PS Chinook salmon fry. We therefore expect that this species could occur within the action area in lower numbers year-round. Though highly degraded due to its former use for log storage, the intertidal mudflat habitat where the derelict vessel is currently located could provide rearing habitat for PS Chinook salmon (Snohomish River Basin 2019). The BA summarizes the critical habitat physical and biological features (PBFs) in the action area for PS Chinook salmon on page 16, emphasizing water quality and availability of prey as key features of critical habitat.

The BA summarizes the status of Puget Sound (PS) steelhead on pages 15 and 16, noting that steelhead presence within the action area could occur year-round, though very few juvenile PS steelhead have been found in the nearshore areas of the Snohomish River Estuary. We add here that both winter- and summer-run populations of PS steelhead with the Snohomish River Estuary have declined precipitously since the early 2000s due to a variety of contributing factors including high rates of early marine mortality (Snohomish River Basin 2019; Malick et al. 2022; Sobocinski et al. 2020).

We supplement the BA's presentation of status of species with the following information on the sunflower sea star, which is currently proposed for listing under the ESA. The sunflower sea star occupies nearshore intertidal and subtidal marine waters shallower than 450 m (~1400 ft) deep from Adak Island, AK, to Bahia Asunción, Baja California Sur, MX. They are occasionally found in the deep parts of tide pools. The species is a habitat generalist, occurring over sand, mud, and rock bottoms both with and without appreciable vegetation. Critical habitat is currently indeterminable because information does not exist to clearly define primary biological features. Prey include a variety of epibenthic and infaunal invertebrates, and the species also digs in soft substrate to excavate clams. It is a well-known urchin predator and plays a key ecological role in control of these kelp consumers. More information about sea star biology, ecology, and their life history cycle is found in the proposed listing (88 FR 2023).

From 2013 to 2017, the sunflower sea star experienced a range-wide epidemic of sea star wasting syndrome (SSWS) (Gravem et al. 2021; Hamilton et al. 2021; Lowry et al. 2022). While the cause of this disease remains unknown, prevalence of the outbreak has been linked to a variety of environmental factors, including temperature change, sustained elevated temperature, low dissolved oxygen, and decreased pH (Hewson et al. 2018; Aquino et al. 2021; Heady et al. 2022; Oulhen et al. 2022). As noted above, changes in physiochemical attributes of nearshore waters are expected to change in coming decades as a consequence of anthropogenic climate change, but the specific consequences of such changes on SSWS prevalence and severity are currently impossible to accurately predict. Sunflower sea stars have almost completely disappeared from Possession Sound since the onset of SSWS; however, they have been observed in small numbers along the shoreline of Hat Island and north of Tulalip Bay as recently as 2022 (Christiaen et al. 2023).

We supplement the BA's presentation of status of species and critical habitat with information summarized in the following two tables (Table 1, Table 2). Table 1 below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. Acronyms appearing in the table include DPS (Distinct Population Segment), ESU (Evolutionarily Significant Unit), ICTRT (Interior Columbia Technical Recovery Team), MPG (Multiple Population Grouping), NWFSC (Northwest Fisheries Science Center), TRT (Technical Recovery Team), and VSP (Viable Salmonid Population). A summary of the status of critical habitats considered in this opinion is provided in Table 2 below.

Table 1. Listing classification and date, recovery plan reference, most recent status review, status summary, and limiting factors for each species considered in this opinion.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Chinook salmon	Threatened 6/28/05 (70 FR 37159)	Shared Strategy for Puget Sound 2007 NMFS 2006	NMFS 2016; Ford 2022	This ESU comprises 22 populations distributed over five geographic areas. All Puget Sound Chinook salmon populations continue to remain well below the TRT planning ranges for recovery escapement levels. Most populations also remain consistently below the spawner–recruit levels identified by the TRT as necessary for recovery. Across the ESU, most populations have increased somewhat in abundance since the last status review in 2016, but have small negative trends over the past 15 years. Productivity remains low in most populations. Overall, the Puget Sound Chinook salmon ESU remains at "moderate" risk of extinction.	• Degraded floodplain and in-river channel structure • Degraded estuarine conditions and loss of estuarine habitat • Degraded riparian areas and loss of in-river large woody debris • Excessive fine-grained sediment in spawning gravel • Degraded water quality and temperature • Degraded nearshore conditions • Impaired passage for migrating fish • Severely altered flow regime
Puget Sound steelhead	Threatened 5/11/07	NMFS 2019	NMFS 2016; Ford 2022	This DPS comprises 32 populations. Viability of has improved somewhat since the PSTRT concluded that the DPS was at very low viability, as were all three of its constituent MPGs, and many of its 32 DIPs (Hard et al. 2015). Increases in spawner abundance were observed in a number of populations over the last five years within the Central & South Puget Sound and the Hood Canal & Strait of Juan de Fuca MPGs, primarily among smaller populations. There were also declines for summer- and winter-run populations in the Snohomish River basin. In fact, all summer-run steelhead populations in the Northern Cascades MPG are likely at a very high demographic risk.	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest • Threats to diversity posed by use of two hatchery steelhead stocks • Declining diversity in the DPS, including the uncertain but weak status of summer-run fish • A reduction in spatial structure • Reduced habitat quality • Urbanization • Dikes, hardening of banks with riprap, and channelization

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Sunflower sea star	Proposed 03/16/2023	N/A	Ongoing	Once prevalent in the Puget Sound, the sunflower sea star experienced a range-wide epidemic of sea star wasting syndrome (SSWS) from 2017 to 2017 (Gravem et al. 2021; Hamilton et al. 2021; Lowry et al. 2022). While the cause of this disease remains unknown, prevalence of the outbreak has been linked to a variety of environmental factors, including temperature change, sustained elevated temperature, low dissolved oxygen, and decreased pH (Hewson et al. 2018; Aquino et al. 2021; Heady et al. 2022). As noted above, changes in physiochemical attributes of nearshore waters are expected to change in coming decades as a consequence of anthropogenic climate change, but the specific consequences of such changes on SSWS prevalence and severity are currently impossible to accurately predict. This species is currently proposed for listing under the ESA.	• Sea Star Wasting Syndrome • Climate-induced changes such as high ocean temperatures, low dissolved oxygen, and decreased pH

Table 2. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
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.

We also supplement the information provided in the BA with the following summary of the effects of climate change on the status of ESA listed species considered in this opinion and aquatic habitat at large.

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.

Forests

Climate change will impact forests of the western U.S., which dominate the landscape of many watersheds in the region. Forests are already showing evidence of increased drought severity, forest fire, and insect outbreak (Halofsky et al. 2020). Additionally, climate change will affect tree reproduction, growth, and phenology, which will lead to spatial shifts in vegetation. Halofsky et al. (2018) projected that the largest changes will occur at low- and high-elevation forests, with expansion of low-elevation dry forests and diminishing high-elevation cold forests and subalpine habitats.

Forest fires affect salmon streams by altering sediment load, channel structure, and stream temperature through the removal of canopy. Holden et al. (2018) examined environmental factors contributing to observed increases in the extent of forest fires throughout the western U.S. They found strong correlations between the number of dry-season rainy days and the annual extent of forest fires, as well as a significant decline in the number of dry-season rainy days over the study period (1984-2015). Consequently, predicted decreases in dry-season precipitation, combined with increases in air temperature, will likely contribute to the existing trend toward more extensive and severe forest fires and the continued expansion of fires into higher elevation and wetter forests (Alizedeh 2021).

Agne et al. (2018) reviewed literature on insect outbreaks and other pathogens affecting coastal Douglas-fir forests in the Pacific Northwest and examined how future climate change may influence disturbance ecology. They suggest that Douglas-fir beetle and black stain root disease could become more prevalent with climate change, while other pathogens will be more affected by management practices. Agne et al. (2018) also suggested that due to complex interacting effects of disturbance and disease, climate impacts will differ by region and forest type.

Freshwater Environments

The following is excerpted from Siegel and Crozier (2019), who present a review of recent scientific literature evaluating effects of climate change, describing the projected impacts of climate change on instream flows:

Cooper et al. (2018) examined whether the magnitude of low river flows in the western U.S., which generally occur in September or October, are driven more by summer conditions or the prior winter's precipitation. They found that while low flows were more sensitive to summer evaporative demand than to winter precipitation, interannual variability in winter precipitation was greater. Malek et al. (2018), predicted that summer evapotranspiration is likely to increase in conjunction with declines in snowpack and increased variability in winter precipitation. Their results suggest that low summer flows are likely to become lower, more variable, and less predictable.

The effect of climate change on ground water availability is likely to be uneven. Sridhar et al. (2018) coupled a surface-flow model with a ground-flow model to improve predictions of surface water availability with climate change in the Snake River Basin. Projections using RCP 4.5 and 8.5 emission scenarios suggested an increase in water table heights in downstream areas of the basin and a decrease in upstream areas.

As cited in Siegel and Crozier (2019), Isaak et al. (2018), examined recent trends in stream temperature across the Western U.S. using a large regional dataset. Stream warming trends paralleled changes in air temperature and were pervasive during the low-water warm seasons of 1996-2015 (0.18-0.35°C/decade) and 1976-2015 (0.14-0.27°C/decade). Their results show how continued warming will likely affect the cumulative temperature exposure of migrating sockeye salmon *O. nerka* and the availability of suitable habitat for brown trout *Salmo trutta* and rainbow trout *O. mykiss*. Isaak et al. (2018) concluded that most stream habitats will likely remain suitable for salmonids in the near future, with some becoming too warm. However, in cases where habitat access is currently restricted by dams and other barriers salmon and steelhead will be confined to downstream reaches typically most at risk of rising temperatures unless passage is restored (FitzGerald et al. 2020, Myers et al. 2018).

Streams with intact riparian corridors and that lie in mountainous terrain are likely to be more resilient to changes in air temperature. These areas may provide refuge from climate change for a number of species, including Pacific salmon. Krosby et al. (2018), identified potential stream refugia throughout the Pacific Northwest based on a suite of features thought to reflect the ability of streams to serve as such refuges. Analyzed features include large temperature gradients, high canopy cover, large relative stream width, low exposure to solar radiation, and low levels of human modification. They created an index of refuge potential for all streams in the region, with mountain area streams scoring highest. Flat lowland areas, which commonly contain migration corridors, were generally scored lowest, and thus were prioritized for conservation and restoration. However, forest fires can increase stream temperatures dramatically in short time-spans by removing riparian cover (Koontz et al. 2018), and streams that lose their snowpack with climate change may see the largest increases in stream temperature due to the removal of temperature buffering (Yan et al. 2021). These processes may threaten some habitats that are currently considered refugia.

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).

Environmental Baseline

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

The BA describes the environmental baseline of the action area on pages 23 and 24. The BA describes the action area within the Snohomish River Estuary as highly degraded habitat due to the degree of upland development, hydromodifications to maintain the Federal Navigation Channel, and legacy contaminants in the sediment from heavy industrial use. Nevertheless, the action area supports a variety of fish, bird, and marine mammal species. The BA outlines use of the Snohomish River Estuary by juvenile Chinook, chum, and coho salmon within the nearshore environment and notes that these species primarily prey on invertebrates within the action area. We add here that recent contamination concentration studies of juvenile PS Chinook salmon within the Snohomish River Estuary indicate that the fish traveling through the action area (Lower Mainstem Snohomish River) experience significantly higher concentrations of persistent organic pollutants (POPs) and polybrominated diphenyl ether flame-retardants (PBDEs) than those traveling through other reaches and distributaries within the estuary, and between 2 to 24 times higher than concentrations found in other Puget Sound estuaries and nearshore habitats. Furthermore, the contaminant concentrations of several natural-origin juvenile PS Chinook salmon within the action area were high enough to result in altered immune response, whereas none of the natural-origin juveniles from the Upper Mainstem or hatchery-origin juveniles from the entire study area exhibit concentrations high enough to alter immune response (O'Neill et al. 2020).

The BA also discusses the substrate, vegetation, and forage fish spawning habitat within the action area, characterizing the absence of natural shoreforms and submerged aquatic vegetation (SAV) from the area surrounding Bulkhead Segment E. The BA further documents the nearest surf smelt and sand lance spawning occurring 0.5 mile southwest of the action area along

Howarth Beach and the nearest Pacific herring spawning occurring over 10 miles northwest in Port Susan. We note here that there is a closer Pacific herring spawning location and pre-spawner herring holding area in Tulalip Bay, approximately 4 miles northwest of the project site (WDFW 2023). Additionally, we add that the Washington Department of Natural Resources (WDNR) has designated approximately 2,300 acres of aquatic lands within Possession Sound as a Kelp and Eelgrass Protection Zone (WDNR 2022). The Puget Sound Eelgrass Monitoring Data Viewer shows relatively abundant eelgrass and *Zostera japonica* within the action area to the west of Jetty Island (WDNR 2023).

Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. 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 assessment provides a detailed discussion and comprehensive assessment of the effects of the proposed action in Sections 4 and 5 of the initiation package, 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.

The temporary and long-term effects of this proposed action are:

- Noise - underwater sound from pile driving and operation of a tug and barge during construction (temporary);
- Water quality diminishment – generation of turbidity, resuspension of contaminants, and decreased dissolved oxygen (DO) during construction (temporary), and the introduction of pollutants into marine waters due to use of ACZA-treated timbers (long-term);
- Shade - increase in overwater coverage within the nearshore environment (predation, disruption to migration – long-term); and
- Shoreline and nearshore modifications – disturbance of bottom sediments (forage – long term) and salt marsh vegetation (rearing -loss of habitat associated with disrupted shore process (long-term).

Underwater Noise

We supplement the BA analysis (pages 25-27 and 34-35) of the effects of underwater sound from vibratory and impact pile driving with the following. NMFS concurs with the conclusion that underwater noise generated from impact pile driving is likely to result in adverse effects to PS Chinook salmon and PS steelhead. As stated on page 27 of the BA, the in-water work window of July 16 through February 15 minimizes but does not preclude the use of the action area by juvenile salmonids. Studies of salmonid migration through the action area indicate that while juvenile PS Chinook salmon density within the action area is significantly lower between July and February, this trend also closely corresponds to water temperatures and can vary in timing from year to year (Frierson et al. 2017 & Chamberlin et al. 2022). Furthermore, adult PS

Chinook salmon and PS steelhead migrate upstream through the action area during this in-water work window (Haley & Aldrich, Inc. 2023). We supplement the BA analysis of disturbance zones from impact driving (page 26) with our understanding that any PS Chinook salmon or PS steelhead within 2 meters (m) of impact driving could be injured or killed from exposure to a single Z sheetpile impact strike (Stadler and Woodbury 2009 & NMFS 2021). Additionally, juvenile PS Chinook salmon within the action area but not close enough for immediate harm may experience sublethal effects from impact pile driving, including acoustic masking (Codarin et al. 2009), startle responses and altered swimming (Neo et al. 2014), abandonment or avoidance of the area of acoustic effect (Mueller 1980; Picciulin et al. 2010; Sebastianutto et al. 2011) and increased vulnerability to predators (Simpson et al. 2016). NMFS disagrees with the conclusion that underwater noise generated from vibratory pile driving would not result in meaningful effects to PS Chinook salmon and PS steelhead. Although no specific studies evaluate the effects of vibratory driving on salmonids, NMFS extrapolates from other studies to determine that vibratory pile driving can result in noise levels sufficient to alter normal behavioral patterns of fish. These behavioral changes may be expressed in predator avoidance responses such as those seen when fish encounter boat noise (van der Knaap et al. 2022). Finally, we note that the project timing, use of BMPs such as a bubble curtain for sound attenuation, and relatively short and intermittent duration of impact pile driving would result in harm to a small number of PS Chinook salmon and PS steelhead relative to the local population.

We add that the operation of a tug and barge would result in slightly elevated noises within Possession Sound. Hydroacoustic monitoring of tug and barge operations from the Port of Seattle indicate that these vessels are likely to generate 127.7 dB of underwater sound on average (Grette Associates, LLC 2022). A 1992 hydroacoustic study within Everett Harbor found ambient sound levels to fall within 80 to 90 decibels (dB) re: 1 μPa (Feist et al. 1992); however, current ambient sound levels are expected to be higher today due to increased operations and louder vessels (Hildebrand 2004; Williams et al. 2015). As the average noise generated by tug and barge operation is above the "effective quiet" threshold of 120dB, we expect that this noise could result in adverse behavioral effects to salmonids. However, we expect these effects to be minor in nature due to the limited use of the tug and barge and the timing of Project activities.

Water Quality

We supplement the BA analysis (pages 29-30 and 34-35) of the effects of turbidity from in-water construction with the following. The BA describes how turbidity generated from pile removal, pile driving, and derelict vessel removal could result in suspended sediment within the 300 ft. mixing zone established by Washington Administrative Code (WAC) 173-201A. The BA describes how very elevated turbidity levels can result in sub-lethal stress for juvenile salmon, and that juveniles will exhibit behavioral changes such as avoidance and diminished forage success at much lower levels of turbidity. We add that physical effects of fish resulting from turbidity are a function of the exposure duration and concentration of the suspended sediment causing the turbidity (Newcombe and Jensen 1996; Wilber and Clarke 2001). Given the scope of work, limited duration of turbidity-generating activities, and ability of salmonids to detect and distinguish turbidity (Quinn 2005) and move away from those areas (Kjelland et al. 2105), we concur that fish are more likely to experience sublethal stress (coughing or gill irritation) and behavioral responses rather than lethal effects. NMFS does not agree with the conclusion that elevated turbidity resulting from Project activities would not adversely affect PS Chinook salmon and PS steelhead. We add here that altered behavior would result in short-term, adverse effects to any juvenile or adult PS Chinook salmon or PS steelhead within the action area during Project activities. Additionally, we note that any fry or juvenile PS Chinook salmon rearing within the intertidal mudflat where the derelict vessel is located would likely experience the greatest impacts from turbidity due to the vulnerable life stage at which they would be exposed. These sub-lethal effects could result in long-term reduced fitness for one cohort of each age class of PS Chinook salmon and PS steelhead that are exposed, but are unlikely to result in death. We do not expect that juvenile or adult PS steelhead, or adult PS Chinook salmon would be as affected as rearing fry or juvenile PS Chinook salmon, as they are unlikely to occupy these nearshore areas for extended periods of time. The use of BMPs including a floating turbidity curtain, and the time of year in which in-water would occur, would further minimize adverse effects.

We supplement the BA analysis (pages 29 and 30) of the effects of the potential resuspension of contaminated sediments on ESA-listed species with the following. NMFS concurs with the BA analysis that the pile driving and removal and wharf construction are unlikely to resuspend harmful levels of contaminants, as the location of these activities has undergone a Washington Department of Ecology (Ecology) ordered site cleanup (Ecology 2024a). This cleanup action was completed in 2015 and a Five-Year Period Review completed in 2023 revealed that all contaminants, while still present at lower levels within the sediment, were below the threshold for remediation (Ecology 2023). The probability of exposure of PS Chinook salmon and PS steelhead at Bulkhead Segment E is generally low given the highly localized nature of sediment resuspension, the work windows designed to avoid peak presence of juvenile salmonids, the BMPs implemented to minimize sediment mobilization, and the studies indicating that salmonids utilize this area primarily as a migratory corridor rather than rearing habitat (Chamberlin et al. 2022). We further note that upon Project completion, the water quality surrounding Bulkhead Segment E will improve due to the removal of approximately 65 tons of creosote from the wharf and piles and the isolation of an additional 17 tons of creosote from the existing bulkhead.

NFMS disagrees with the BA conclusion that the potential for resuspension of contaminants when removing the derelict vessel would not adversely affect PS Chinook salmon and PS steelhead. The derelict vessel is located within the Bay Wood Products Model Toxics Control Act (MTCA) remediation site, whose sediment contains several contaminants in concentrations above the cleanup threshold (Ecology 2024b). The removal of the derelict vessel has the potential to resuspend dioxins/furans, Polycyclic Aromatic Hydrocarbons (PAHs), and other suspected contaminants into the water column (Ecology 2024c). Exposure to these contaminants could result in a variety of lethal and sub-lethal outcomes for salmonids, including impaired growth and reproduction, reduced forage success, increased predation, neurological effects, and reduced disease resistance (Meador 2002; Peterson et al. 1993; Lanham et al. 2011; Walker and Peterson 1992; Walker et al. 1994; Berntssen et al. 2003; Peterson et al. 2007; Baali and Yahyaoui 2016; Heintz et al. 2010). Resuspension of contaminated sediments is proportional to the amount of disturbance and the local levels of contamination. The degree of impact to ESA-listed salmonids would therefore depend on the method of vessel removal that is selected. Option 1 would result in the least impact from resuspension of contaminants, as work would primarily occur from land or on crane mats, and vessel removal would occur in the dry during low tide events. Options 2A and 2B would both result in significantly higher impacts from contaminant resuspension, as 2A would require the grounding out of a crane barge and materials barge and

2B would occur during high tide cycles when the potential for resuspension within the water column is highest. We anticipate that contaminant concentration rates could be increased for the duration of vessel removal operations (up to 15 days depending on the selected method), and for a short time afterward depending on the degree of sediment disturbance. Any PS Chinook salmon fry or juveniles rearing within the intertidal marsh area would experience the greatest amount of injury, including potentially lethal levels of toxicity. A majority of the adult PS Chinook salmon and juvenile and adult PS steelhead migrating through the area are likely to avoid the immediate vicinity of the vessel removal and would therefore experience low levels of exposure. Furthermore, the use of a floating turbidity curtain and placement of a 6-inch layer of clean sand on the footprint of the vessel in each of the vessel removal scenarios, as well as the timing of the project, would minimize the number of fish expected to be present within the area. Once the vessel has been removed, the tidal marsh will provide higher quality rearing habitat for juvenile salmonids due to water quality improvements and 3,600 SF of new benthic habitat for forage.

We supplement the BA analysis (pages 28-30) of the effects of diminished water quality on ESA-listed salmonids with an analysis of the short-term effects of reduced DO related to construction activities. Suspension of anoxic sediment compounds during in-water construction can result in reduced DO in the water column as the sediments oxidize. Sub-lethal effects of DO levels below saturation can include the impairment of metabolic, feeding, growth, and behavioral functions in salmonids. Behavior responses can include avoidance and migration disruption (NMFS 2005). The Bay Wood Products cleanup area historically experienced low levels of DO due to its use for log handling and storage until 1994; however, neither Bulkhead Segment E nor the mudflat where the derelict vessel is located are currently classified as impaired due to low DO levels (Ecology 2024c). A model created by LaSalle (1988) demonstrated that, even in a situation where the upper limit of expected suspended sediment is reached during dredging operations, DO depletion of no more than 0.1 mg/L would occur at depth. The suspended sediment generated from pile driving and removal activities at Bulkhead Segment E is expected to be much smaller than a dredging operation and it is therefore highly unlikely that DO depletion would rise to this upper limit. Depending on the method of vessel removal selected, this action could result in levels of turbidity on par with a dredge event. Any reduction in DO related to vessel removal should be limited in extent and temporary in nature. For these reasons, this proposed action is not likely to result in the sub-lethal effects outlined above. Additionally, the short duration of the vessel removal (up to 15 days) and the in-water work window further reduce the potential for adverse effects to ESA-listed salmonids as a result of low DO.

We supplement the BA analysis (pages 28-30) of the effects of diminished water quality on ESA-listed salmonids with an analysis of the long-term effects of contaminants leaching into the water from ACZA-treated timbers. The water quality for ESA-listed species present would be adversely impacted by the use of ACZA-treated timbers in the deck of the replacement wharf for the duration of time that this structure remains within the nearshore environment. A pesticide-treated wood structure placed in or over flowing water will leach copper and a variety of other toxic compounds directly into the stream (Hingston et al. 2001; Kelty and Bliven 2003; Poston 2001; Weis and Weis 1996). Leaching rates of trace metals from ACZA-treated lumber are initially higher when compared to other treated wood such as chromated copper arsenate (CCA) and ammoniacal copper quat (ACQ) (Dickey 2003). However, these differences are minor and leaching rates drop precipitously within days to weeks of installation (Poston 2001). Preservatives leached into water are more likely to migrate downstream compared with preservatives leached into soil, with much of the mobility occurring in the form of suspended sediment. If shavings, sawdust, or smaller particles of pesticide-treated wood generated during construction, use, or maintenance of a structure are allowed to enter soil or water below, they make a disproportionally large contribution to environmental contamination because the rate of leaching from smaller particles is 30 to 100 times greater than from solid wood (FPL 2001; Lebow 2004; Lebow and Tippie 2001). Therefore, we anticipate that the water quality within the footprint of the new wharf will be most significantly impacted in the short-term, with continued leaching at much lower rates occurring for the duration of the structure above the water. NMFS expects that the BMPs intended to contain and remove debris during construction will significantly limit the large contribution of leached contaminants into the marine environment.

Shade

We supplement the BA analysis (pages 31-32 and 34-35) of the effects of shade on the migration, behavior, and predator avoidance of ESA-listed salmonids with the following. The BA states that the 1,460 SF of increased overwater coverage would degrade forage opportunities and impair migratory behaviors for juvenile salmonids, but notes that this decrease in productivity would occur in an area that is already significantly impaired due to over 50 years of use for commercial and recreational purposes. In the marine nearshore, there is substantial evidence that overwater structures impede nearshore movements of juvenile salmonids with fish stopping at the edge of the structure and avoiding swimming into the shadow or underneath the structure (Heiser and Finn 1970, Able et al. 1998, Simenstad 1999, Southard et al. 2006, Toft et al. 2007, Ono 2010). As a result of juvenile salmon avoiding overwater structures, some are expected to swim around the structure (Nightingale and Simenstad 2001). This behavior modification would cause them to temporarily swim into deeper water, exposing them to increased predation. Hesitating upon first encountering the structure also exposes salmonids to avian predators. The effect of the wharf replacement and extension would directly affect PS Chinook salmon and PS steelhead migrating through the project area by diminishing prey availability (benthic invertebrates) and increasing predation (Shipman et al. 2010, Dethier et al. 2016). These effects would be long-term and are considered permanent for the life of the structure. For this assessment we consider the life of the structure to be 50 years. In terms of effects of the wharf replacement on the population of PS Chinook salmon and PS steelhead within the action area, the presence of the wharf would continue to increase the risk of predation for those individuals that migrate along the nearshore of the Lower Mainstem Snohomish River and reduce the availability of food for them. We expect that juvenile PS Chinook salmon would be most affected by this action, as they are nearshore dependent unlike adult PS Chinook salmon and juvenile and adult PS steelhead. It is likely that a small fraction of the fish utilizing this area for forage and migration may die as a direct result of the proposed action. However, the effect to the population would not be measurable because only a small fraction of the juveniles from any one cohort are likely to enter the area and be exposed to predation in this particular action area. The vast majority of the fish are likely to swim directly out of the Lower Mainstem Snohomish River and not enter the portion of the action area subject to shading effects.

Shoreline and Nearshore Modifications
We supplement the BA analysis (pages 29-32 and 34-35) of the effects of diminished prey base from disturbance to benthic communities with the following. The BA highlights that the in-water activities associated with the replacement of Bulkhead Segment E will result in the loss of 2,770 SF of intertidal marine habitat due to the isolation of the existing creosote bulkhead and the installation of a new bulkhead approximately 10 ft. waterward of the existing bulkhead. The BA characterizes the forage opportunities provided at Bulkhead Segment E as low quality and severely degraded, noting shade from the existing wharf has degraded the benthic communities in the 2,770 SF that would be removed due to bulkhead installation. We add that existing shoreline armoring on nearshore and intertidal habitat throughout the Puget Sound has diminished sediment supply, diminished organic material (e.g. woody debris and beach wrack) deposition, diminished overwater (riparian) and nearshore in-water vegetation (SAV), diminished prey availability, diminished aquatic habitat availability, diminished invertebrate colonization, and diminished forage fish populations (Toft et al. 2007; Shipman et al. 2010; Sobocinski et al. 2010; Morley et al. 2012; Toft et al. 2013; Munsch et al. 2014; Dethier et al. 2016). We expect that some emigrating juvenile PS Chinook salmon would experience reduced growth and fitness as a result of the proposed action every year that the new bulkhead is in place. We do not, however, expect that these effects would result in a meaningful reduction in the population due to the relatively localized nature of the impact and the existing degraded condition of the site. We do not expect that adult PS Chinook salmon or juvenile or adult PS steelhead would experience these effects to the same degree as juvenile PS Chinook salmon, as they are not as nearshore dependent.

We add here that the long-term disturbance to benthic communities within the mudflats where the derelict vessel is located would be far greater and more impactful to the PS Chinook salmon prey base, depending on which method of vessel removal is selected. Option 2B would cause very limited impacts to benthic communities due to the work taking place during periods of high tide, and we would expect impacts to be limited to the immediate vicinity of the vessel's footprint. Option 2B would likely impact a larger area of benthic habitat due to the placement of crane mats, however we would expect these communities to recolonize very quickly due to the short amount of time which mats would be placed upon them and the relatively minor disturbance to the substrate. Option 2A would likely cause the largest impact to benthic communities due to the grounding of a crane barge and materials barge within the intertidal marsh. Several studies have demonstrated that benthic organisms rapidly recolonize habitats disturbed by dredging (McCabe et al, 1996; Quinn et al, 2003; Richardson et al, 1977; Van Dolah et al, 1984). However, the speed of recovery by benthic communities is affected by several factors, including the intensity of the disturbance, with greater disturbance increasing the time to recovery (Dernie et al, 2003). The infaunal community within the footprint of the ground out barges would experience disruption during vessel removal and for a short time after, and would be expected to recover toward baseline levels within several months with full recruitment of prey complexity and abundance taking up to 3 years. As juvenile PS Chinook salmon likely utilize the marsh for rearing, this would result in the reduction of forage opportunities that would gradually improve over this 3-year period. Once the derelict vessel is removed, benthic communities would have an additional 3,600 SF of habitat to colonize, providing a long-term benefit for juvenile PS Chinook salmon forage within the marsh. We do not expect that adult PS Chinook salmon, or juvenile or adult PS steelhead would utilize the marsh for forage opportunities due to their life history strategies, and therefore consider the effects to their prey bases to be substantially lower.

Option 1 for vessel removal, if selected, would result in the placement of crane mats on top of approximately 1,000 SF of riparian vegetation and up to 720 SF of salt marsh vegetation within the intertidal mudflat. Surveys of coastal watersheds throughout the Pacific Northwest have verified the importance of shallow-water estuarine marshes, sloughs, and floodplains as transitional environments for salmon fry prior to their emigration to open waters (Levy and Northcote 1982; Bottom et al. 2011). PS Chinook salmon fry will often occupy these habitats within days of their emergence from freshwater gravel beds and rely on these areas for refuge from marine predators and forage opportunities, allowing individuals to acclimate to salt water and grow which in turn improves their fitness in marine waters (Thorpe et al. 1994; Miller and Simenstad 1997; Bottom et al. 2011). Within the Snohomish River Delta, insects comprise a disproportionally high proportion of PS Chinook salmon diets while rearing in estuaries, and estuarine emergent marshes such as the one within the Project area provide a greater abundance of these prey resources, due in large part to the vegetation type (Chamberlin 2022). Disturbance to the riparian and estuarine vegetation within this intertidal marsh would result in diminished forage opportunities for rearing salmonids until the vegetation re-establishes. These impacts could last up to five years, though the vegetation would likely re-establish much sooner due to the limited nature of impacts (Wolters et al. 2008). The removal of the derelict vessel would introduce new areas for emergent marsh vegetation to establish, increasing forage opportunities for rearing salmon in the long-term.

We supplement the BA analysis (pages 30-31 and 37) of the effects of the proposed action on PS Chinook salmon critical habitat within the action area with the following: The BA characterizes the impacts to the water quality element of the nearshore marine PBF as short-term in nature and related to the construction activities, whereas the impacts to the forage and migration elements of the nearshore marine PBF would be permanent. We add here that the water quality PBF would be degraded in the long-term by the use of ACZA-treated timbers within the marine environment. The BA further notes that the project would result in a degradation of PS Chinook salmon critical habitat, though this diminishment would occur in a very limited footprint. NMFS concurs with this analysis and adds that the offsetting beneficial actions included in the Project would result in permanent improvements to the water quality, forage, rearing, and migration elements of PS Chinook salmon critical habitat.

We have analyzed the permanent effects to the aquatic habitat resulting from this Project and have determined that the functional improvement provided by the proposed mitigation would offset the loss of ecosystem functions due to the modification of habitat. As mitigation for the replacement of Bulkhead Segment E, the applicant proposes to remove or isolate approximately 87 tons of creosote from the nearshore environment and remove a derelict vessel that has been embedded within the intertidal mudflats for at least 30 years. As the Port has committed to paying for at least 20% of this vessel removal, this is the portion of that action that NMFS has analyzed as compensatory mitigation for Project activities. The replacement of Bulkhead Segment E would primarily impact juvenile salmonids on their outward migration in an area that is likely not used extensively for forage or shelter. The derelict vessel removal, however, would restore 720 SF of shallow-water habitat within an emergent estuarine marsh for forage opportunities. This vessel removal would improve the conditions of suitable rearing habitat and increase the juvenile rearing capacity within the Snohomish River Estuary – a primary goal for recovery of PS Chinook salmon (Chamberlin 2022). We therefore determine that the functional lift provided by the derelict vessel removal, as well as the creosote removal and isolation from the existing bulkhead and wharf, would achieve no-net-loss of habitat function, which is needed to ensure that populations of PS Chinook salmon do not drop below the existing 1-2 percent juvenile survival rates (Kilduff et al. 2014; Cambell et al. 2017). PS Chinook salmon juvenile survival is directly linked to the quality and quantity of nearshore habitat, both of which would be improved by the derelict vessel removal.

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. We adopt by reference the analysis of cumulative effects in the BA (pages 32 and 33) and add the following.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described earlier in the discussion of environmental baseline and status of the species. Because Possession Sound and its nearshore environment are expected to remain highly industrialized and utilized for several decades to come, we do expect climate change conditions to become more pronounced over that time period. As a result, we anticipate that these changes may disrupt important habitat features and ecosystem functions that are critical to the survival and recovery of the species discussed in this opinion.

Other than commercial and recreational use of the waters, NMFS does not expect any non-Federal activities within the action area, as work within the water would fall under federal authorities such as the Clean Water Act. However, as the human population continues to grow, demand for agricultural, commercial, and residential development and supporting public infrastructure is also reasonably certain to grow. We believe the majority of environmental effects related to future growth will be linked to these activities, in particular land clearing, associated land-use changes (i.e., from forest to impervious, lawn or pasture), increased impervious surface, and related contributions of contaminants to area waters. Land use changes and development of the built environment that are detrimental to salmonid habitats are reasonably certain to continue under existing regulations. Though the existing regulations minimize future potential adverse effects on salmon habitat, as currently constructed and implemented, they still allow systemic, incremental, additive degradation to occur.

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.

As indicated in Table 1, ESA-listed salmon and steelhead species are at a low level of persistence and moderate to high risk of extinction. Moreover, several of the limiting factors for the viability of these species (e.g., degraded habitat conditions, poor water quality) are prevalent within the action area. We add to this the effects of the proposed action. When reviewing the effects described in the BA in combination with our supplemental analysis presented above, we expect that some juvenile and adult PS Chinook salmon and juvenile and adult PS steelhead could be exposed to underwater noise, degraded water quality conditions, diminished prey availability, obstructions to migration, and predation resulting from the replacement of Bulkhead Segment E and the construction-related impacts associated with removing the derelict vessel. We expect that these effects will result in responses ranging from behavioral changes that reduce fitness and increase the risk of injury or death, to actual injury or death. We do not anticipate that the effects of the proposed action alone would be measurable at a population level for PS Chinook salmon or PS steelhead.

The last element in the integration of effects includes a consideration of the cumulative effects anticipated in the action area. As stated above, the existing condition of habitat within Possession Sound and the Port of Everett Marina is highly degraded and these conditions are expected to decline over the coming decades. The Project would result in long-term, adverse effects to PS Chinook salmon and PS steelhead in a relatively localized area. Conversely, the quality of the intertidal mudflat habitat where the derelict vessel is located is expected to improve in the future due to the vessel removal and an ongoing MTCA site cleanup, which could improve rearing capacity for juvenile salmonids. Given the footprint of the Project and the offsetting mitigation measures, we do not expect that the effects of this action would alter fitness, growth, or survival of enough fish to discernably reduce the abundance of any cohort of any population.

Accordingly, when NMFS adds the very small reduction in numbers of PS Chinook salmon and PS steelhead as a consequence of their exposure to the short-term and enduring Project effects, to the baseline, even when considered with cumulative effects, the reduced abundance would be insufficient to alter the productivity, spatial structure, or genetic diversity of any of the species. Therefore, the action does not appreciably reduce the likelihood for survival and recovery of the listed species.

The sunflower sea star is proposed for listing throughout its range, and no data exist to suggest anything other than a single, panmictic population, so, to reach a determination of jeopardy, a proposed action would have to impact range-wide population dynamics. We are not currently aware of any habitat types or locations used by sunflower sea stars for mating or spawning, larvae are planktonic, and newly settled juveniles appear in a variety of habitats. We do not expect any single site-specific action to result in jeopardy, but broad-scale programmatic actions occurring over a substantial portion of the range might result in appreciable reductions in the number, distribution, or reproduction of sea stars. Each action will need to be evaluated on a case-by-case basis.

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 PS Chinook salmon or PS steelhead, or destroy or adversely modify the designated critical habitat of PS Chinook salmon.

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

Take in the form of harm is often impossible to quantify as a number of individuals, because the presence of the individuals (exposure to the harmful conditions) is highly variable over time, and is influenced by factors that cannot be easily predicted. Additionally, the duration of exposure is highly variable based on species behavior patterns, and the wide variability in numbers exposed and duration of exposure creates a range of responses, many of which cannot be observed without research and rigorous monitoring. In these circumstances, we described an "extent" of take which is a measure of the harming condition spatially, temporally, or both. The extent of take is causally related to the amount of harm that would result, and each extent of take provided below is an observable metric for monitoring, compliance, and re-initiation purposes.

The amount and extent of take in this ITS serves two functions: (1) it identifies the quantity of incidental take exempted for the action agency and applicant. In the case of a species without 4(d) protective regulations, such as the sunflower sea star, the exemption is not needed because incidental take is not prohibited; and (2) it serves as a check on NMFS's jeopardy analysis. The amount or extent of take identifies the anticipated level of take NMFS considered in reaching its conclusion that the proposed action will not jeopardize the continued existence of a listed species. If this level of take is exceeded, reinitiation of consultation is triggered to ensure that NMFS's no-jeopardy conclusion remains valid.

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

1. Take in the form of injury, death, or harm of PS Chinook salmon and PS steelhead from noise during vibratory and impact pile driving. The extent of take for hydroacoustic effects is a maximum of 12 consecutive hours of impact pile driving with a 12-hour delay before resuming each day's impact pile driving, for a total of 42 days of pile driving. This surrogate indicator of take is both easily observable, and is causally linked to incidental take by hydroacoustic impacts because the amount of take increases incrementally with each pile strike and hydroacoustic impacts return to baseline SELs after a 12-hour delay.

2. Take in the form of harm, injury, or death of PS Chinook salmon and PS steelhead as a result of exposure to diminished water quality from the generation of turbidity and the resuspension of contaminated sediments during construction. The extent of take is the 300 ft. mixing zone around Project activities where turbidity is expected to be elevated above background levels. This metric is causally related to take because a larger mixing zone would increase the risk of injury for fish occupying the Project area.

3. Take in the form of harm to PS Chinook salmon and PS steelhead from water quality reductions caused by the installation of ACZA-treated timbers on the new wharf. The extent of take is the area of the wharf over water (3,560 SF) which could leach trace metals into the water. This metric is easily observable and causally related to take because a larger area of overwater coverage would result in more leaching, further diminishing water quality.

4. Take in the form of harm, injury, or death of sunflower sea star from bulkhead and wharf replacement activities. The extent of take is the duration of pile driving, pile removal, and bulkhead isolation activities (42 days). This metric is easily observable and causally related to take because the potential for a sunflower sea star to utilize the structure and be injured by construction increases with the amount of time that in-water work occurs.

5. Take in the form of harm of juvenile PS salmonids from predacious fish utilizing shade cast by the wharf. The extent of take is the size of the overwater structure (3,560 SF). This metric is easily observable and causally related to take because a larger area of overwater coverage would increase the suitability of the area to predacious fish and increase the risk of predation.

6. Take in the form of harm of PS Chinook salmon and PS steelhead from loss of nearshore habitat and prey availability caused by the replacement of the bulkhead waterward of the existing structure. The extent of take is the area behind the bulkhead that would be cut off from the nearshore environment (2,770 SF). This metric is easily observable and causally related to take because a larger area of habitat loss would further diminish forage opportunities for PS salmonids, reducing fitness.

7. Take in the form of harm of PS Chinook salmon and PS steelhead from reduced prey availability and natural cover resulting from impacts to riparian and salt marsh

vegetation. The extent of take is the size of the temporary fill ramp (6,579 SF) and crane mats (720 SF) that would be placed within the intertidal mudflat and along the shoreline if Option 1 is selected for vessel removal. This metric is easily observable and causally related to take because a larger area of vegetation disturbance would further reduce forage opportunities and rearing availability for PS salmonids.

8. Take in the form of harm of PS Chinook salmon and PS steelhead from short-term reduced prey availability resulting from impacts to benthic habitat. The extent of take is the size of the barge that would ground out if Option 2A is selected for vessel removal (7,500 SF). This metric is easily observable and causally related to take because a larger area of benthic disturbance would further reduce forage opportunities for PS salmonids.

Effect of the Take

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

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. Minimize take associated with pile driving.
2. Minimize take associated with diminished water quality.
3. Minimize take associated with in- and overwater habitat modification.
4. Minimize take associated with disturbance of benthic habitat and vegetation during derelict vessel removal.
5. Ensure the completion of a monitoring and reporting program to confirm the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are met.

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

1. The following terms and conditions implement reasonable and prudent measure 1 (noise):

    a. When possible, drive piles in the dry, and when driving piles in water, use a bubble curtain or similar sound attenuation system capable of achieving up to 5 dB of sound attenuation during impact pile driving. Limit impact pile driving activities to 12 consecutive hours of impact pile driving with a 12-hour delay before resuming each day’s impact pile driving.

2. The following terms and conditions implement reasonable and prudent measure 2 (water quality reductions):

    a. The Port or its contractor shall make visual observations for turbid conditions while conducting in-water work activities. If turbidity creates a visible plume extending beyond the 150-ft. point of compliance, the Port or its contractor shall take corrective actions, such as modification of construction procedures, implementation or modification of engineering controls, and suspension of operations until the plume no longer exceeds 150 ft.
    b. When disturbing sediment within the Bay Wood Products MTCA Cleanup Site, ensure that a 6-inch layer of clean sand be placed so that all disturbed areas are covered to prevent the resuspension of contaminated sediment. Should disturbance occur beyond the 3-foot-wide perimeter surrounding the derelict vessel that is outlined in the BA, clean sand must be placed in a larger perimeter.

3. The following terms and conditions implement reasonable and prudent measure 3 (in- and overwater structures):

    a. If a sunflower sea star is identified on the existing piles or bulkhead prior to or during construction, the Port or its contractors shall carefully relocate it outside of the area of impact and notify NMFS.

4. The following terms and conditions implement reasonable and prudent measure 4 (impacts during vessel removal):

    a. If Option 1 (access from land) is selected for vessel removal, once the crane mats are placed within the mudflat, minimize their movement to prevent damaging a larger area of vegetation. Ensure that crane mats are removed from the mudflat at the earliest possible opportunity once work is complete.
    b. If Option 2A (grounding barge, working in the dry) is selected for vessel removal, make every feasible and safe effort to minimize the frequency and location of grounding the materials and crane barges to minimize impacts to benthic habitat.
    c. If Option 2B (working at high tides in the water) is selected for vessel removal, make every effort to extract the derelict vessel in one piece if feasible to reduce the time that disturbance within the mudflat will occur.

   d. During vessel removal operations, inspect the water around the barges and derelict vessel for any sheen. If a sheen is observed, deploy spill response equipment such as an oil absorbent sock or similar to address the pollutant.

5. The following terms and conditions implement reasonable and prudent measure 5 (monitoring):

   a. Provide a post-project report that includes:
      i. The number of strikes per pile, the number of piles installed, the type of piles installed, the time between pile installation sessions, the total days of pile driving, the type and use of sound attenuation device, and type of driving hammer used.
      ii. Completed dimensions of the new wharf's overwater coverage and the isolated area between the existing and new bulkheads to ensure that these extent of take metrics are not exceeded.
      iii. The actual method of derelict vessel removal, reporting the dimensions of the temporary ramp and crane mats (if implementing Option 1), the dimensions of the barge that grounded out (if implementing Option 2A), any turbidity exceedances, and the actions taken to prevent further exceedances.
      iv. Provide a post-project report informed by the Marine Mammal Monitoring Plan. Document the number of times work was ceased to avoid exposure to whales, the type of whale(s) sighted, and the location and date of the sighting(s).
      v. Provide NMFS with creosote dump receipts and a photograph of the creosote on the dump scale to verify the amount of creosote removed from the water.
   b. Fish Impacts Monitoring. While in-water work occurs, make regular visual survey for distressed, injured, or dead fish. Collect dead specimens if possible and have them identified by species. Include results in the post-project reporting.
   The Port or its contractor must submit these monitoring reports within 60 days of the completion of in-water Project activities to:
   ProjectReports.wcr@noaa.gov
   Reference Project No.: WCRO-2023-03486
   cc: sara.m.tilley@noaa.gov

Conservation Recommendations

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

1. Continue to support the recovery of ESA-listed species and critical habitat in the Salish Sea through restoration efforts such as the planting of submerged aquatic vegetation,

removal of armoring along shorelines, and removal of overwater structures, particularly within the nearshore environment.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the FHWA 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.

"Not Likely to Adversely Affect" Determinations

Puget Sound/Georgia Basin (PS/GB) bocaccio:
We supplement the BA analysis (pages 18, 28, and 36) of the potential for PS/GB bocaccio to occur within the Project area with the following. The BA describes the preferred habitat conditions for juvenile and adult PS/GB bocaccio and outlines how these characteristic habitat features are absent within Possession Sound. NMFS concurs that it is highly unlikely that PS/GB bocaccio would occupy the area landward of Jetty Island around Bulkhead Segment E or the intertidal mudflat where the derelict vessel is located. We add that it is slightly more likely that PS/GB bocaccio could occur within two miles of the shoreline where the tug and barge are likely to travel to reach the Project area, as this area contains ample eelgrass and kelp, which could support juvenile rockfish (WDNR 2022). A 2016 spatial analysis of rockfish within Puget Sound determined that there was a hot spot area for PS/GB bocaccio along the southwestern shore of Camano Island, approximately 7 miles from the furthest extent of the Project action area (NRC 2016). However, this study also determined that PS/GB bocaccio hot spot areas occurred at depths greater than 52.4 meters and rarely overlapped with nearshore habitat. Therefore, we consider it extremely unlikely that PS/GB bocaccio would be exposed to the most impactful Project activities (i.e., pile driving, turbidity, and benthic disturbance). It is possible (though still unlikely) that PS/GB bocaccio could occur within the outer limits of the action area during the Project where the tug and barge would travel. However, given the slow-moving nature of barges and the very limited duration of time that we would expect the tug and barge to occupy this area before entering Possession Sound, it is extremely unlikely that PS/GB bocaccio would experience any adverse effect as a result of the tug and barge's presence. We have therefore determined that PS/GB bocaccio may be affected, but are not likely to be adversely affected by the proposed activities.

Puget Sound/Georgia Basin (PS/GB) yelloweye rockfish:
We supplement the BA analysis (pages 18, 28, and 37) of the potential for PS/GB yelloweye rockfish to occur within the Project area with the following. The BA describes the preferred habitat conditions for juvenile and adult PS/GB yelloweye rockfish and outlines how these characteristic habitat features are absent within Possession Sound. NMFS concurs that it is highly unlikely that PS/GB yelloweye rockfish would occupy the area landward of Jetty Island

around Bulkhead Segment E or the intertidal mudflat where the derelict vessel is located. We add that it is slightly more likely that PS/GB yelloweye rockfish could occur within two miles of the shoreline where the tug and barge are likely to travel to reach the Project area, as this area contains ample eelgrass and kelp, which could support juvenile rockfish (WDNR 2022). A 2016 spatial analysis of rockfish within Puget Sound determined that there was a hot spot area for PS/GB yelloweye rockfish approximately 1 mile west from the furthest extent of the Project action area (NRC 2016). However, this study also determined that PS/GB yelloweye rockfish hot spot areas occurred at average depths of 100.9 meters and rarely overlapped with nearshore habitat. Therefore, we consider it extremely unlikely that PS/GB yelloweye rockfish would be exposed to the most impactful Project activities (i.e., pile driving, turbidity, and benthic disturbance). It is possible (though still unlikely) that PS/GB yelloweye rockfish could occur within the outer limits of the action area during the Project where the tug and barge would travel. However, given the slow-moving nature of barges and the very limited duration of time that we would expect the tug and barge to occupy this area before entering Possession Sound, it is extremely unlikely that PS/GB yelloweye rockfish would experience any adverse effect as a result of the tug and barge's presence. We have therefore determined that PS/GB yelloweye rockfish are not likely to be adversely affected by the proposed activities.

Southern Resident Killer Whale (SRKW):
We supplement the BA analysis (pages 28 and 36) of the potential for SRKW to occur within the Project area with the following. The BA describes how SRKW are unlikely to be directly affected by Project operations as they have never been sighted landward of Jetty Island where the most impactful Project activities (i.e., pile driving and impaired water quality) would occur. The BA further states that effects to the SRKW prey base via adverse effects to PS Chinook salmon would not adversely affect SRKW due to the limited scope and duration of the project. We add here that between 1999 and 2022, there have been a total of 10 sightings of SRKW within the 4.6 km x 4.6 km quadrant where the Project would occur (NOAA Fisheries 2024). The presence of SRKW within the action area is extremely rare and the likelihood of an SRKW entering the action area during Project activities is very low due to the Project's proximity to the shoreline and relatively shallow depths (between 28-35 ft.). The Port would also implement a Marine Mammal Monitoring Plan during pile driving operations to further minimize the potential for SRKW presence during construction. Furthermore, as stated above in the Effects of the Action Section, the effects of this Project on PS Chinook salmon would cause a negligible annual reduction in the population, and would not meaningfully diminish prey quantity as a habitat feature. Based on this analysis, NMFS concurs that the proposed action is not likely to adversely affect SRKW.

We supplement the BA analysis (pages 28 and 37-38) of the effects of the proposed action on SRKW critical habitat within the action area with the following. The BA describes how the operation of a tug and barge to access the site would occur within a small portion of designated SRKW critical habitat. The BA further characterizes the impacts to the water quality, prey availability, and migration PBFs related to tug and barge operation as short-term in nature and limited in scope, though it acknowledges that these actions may temporarily diminish the value of that critical habitat. We note that a tug and barge are typically very slow moving and would not occupy the area beyond Jetty Island for a long duration of time. Given the very low likelihood that any SRKW would occur within the action area at the same time as the tug and barge, we have determined that the Project would not meaningfully impact the water quality and migration PBFs for SRKW. Furthermore, though we do anticipate adverse effects to SRKW prey resources as a result of this Project, we do not expect that those effects would be measurable on a population level. Therefore, NMFS has determined that the Project would not significantly affect the designated critical habitat for SRKW within the action area.

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.

All of the Project activities described above have the potential to adversely affect EFH for Pacific Coast groundfish, Pacific Coast salmon, and coastal pelagic species.

1. Pile driving and removal could result in reoccurring short-term increases in turbidity and resuspension of contaminated sediments, as well as underwater noise that could be injurious to fish.

2. Derelict vessel removal could result in short-term increases in turbidity and resuspension of contaminated sediments, and disruptions to benthic invertebrates that comprise the prey base for many of these species.

3. Bulkhead and wharf replacement, as well as derelict vessel removal, could result in alterations to aquatic habitat, including estuarine submerged aquatic vegetation (a Habitat of Particular Concern [HAPC] for Pacific Coast salmon) and an estuary (a HAPC for Pacific Coast salmon and Pacific Coast groundfish).

EFH Conservation Recommendations

1. Monitor turbidity and other water quality parameters to ensure that the parameters outlined in WAC 173-201A are not exceeded. Implement corrective measures if temporary water quality standards are exceeded.
2. Take care when removing piles to minimize bed disturbance and suspended sediments. Utilize a containment boom to collect any floating debris and sheen while creosote is being removed.
3. Utilize methods to reduce in-water noise, such as the use of a soft-start technique, the implementation of a bubble curtain or similar noise reduction device, and the use of a vibratory hammer when feasible.

Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the FHWA 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)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted. ProjectReports.wcr@noaa.gov, Reference Project No.: WCRO-2023-03486.

DATA QUALITY ACT

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/welcome]. A complete record of this consultation is on file at the NOAA office in Lacey, Washington.

Please contact Elizabeth Babcock in Seattle, Washington at Elizabeth.babcock@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: Cindy Callahan, FHWA
Melanie Vance, WSDOT Local Programs
Jennifer Lang, WSDOT Local Programs Liaison
Laura Gurley, Port of Everett

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APPENDIX A

ion Agency Reference #	
FWS or NMFS #	WCRO-2023-03486
Project Name:	Port of Everett SR 529 West Marine View Drive Bulkhead Replacement and Wharf Improvem
Prepared on and by: (Add each update)	S. Tilley on 4/1/2024

Puget Sound Nearshore Habitat Conservation Calculator

Version 1.6 — 3/22/2024

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	-222	-2.22
	Credit (includes creosote removal)	249	2.49
	Balance	**27**	**0.27**
Shoreline Armoring	Debit	0	0.00
	Credit from Armor Removal	0	0.00
	Credit from Creosote Removal	0	0.00
	Balance	**0**	**0.00**
Maintenance Dredging	**Balance**	**0**	**0.00**
Boatramps, Jetties, Rubble	Debit	0	0.00
	Credit	0	0.00
	Balance	**0**	**0.00**
Riparian Enhancement/Degradat	**Balance**	**0**	**0.00**
SAV Planting	**Conservation Credit**	**0**	**0.00**
bitat Loss / Remaining Conservation Offsets Need		**0**	**0.00**
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.

on Agency Reference #			
FWS or NMFS #	WCRO-2023-03486		
Project Name:	Port of Everett SR 529 West Marine View Drive Bulkhead Replacement and Wharf I		
Prepared on and by: (Add each update)	S. Tilley on 4/1/2024		
Puget Sound Nearshore Habitat Conservation Calculator			
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		Conservation Credits/Debits	**DSAYs (Discounted Service Acre Years)**
Overwater Structures	Debit	0	**0.00**
	Credit (includes creosote	11	**0.11**
	Balance	**11**	**0.11**
Shoreline Armoring	Debit	0	**0.00**
	Credit from Armor Removal	0	**0.00**
	Credit from Creosote Removal	0	**0.00**
	Balance	**0**	**0.00**
Maintenance Dredging	**Balance**	**0**	**0.00**
Boatramps, Jetties, Rubble	Debit	0	**0.00**
	Credit	0	**0.00**
	Balance	**0**	**0.00**
Riparian Enhancement/Degrada	**Balance**	**0**	**0.00**
SAV Planting	**Conservation Credit**	**0**	**0.00**
itat Loss / Remaining Conservation Offsets Nee		**0**	**0.00**
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.