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-2023-00189**

November 21, 2023

Kristine Gilson
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1200 New Jersey Avenue, SE
Mail Drop #1
Washington, DC 20590

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Port of Grays Harbor Terminal 4 Expansion and Redevelopment Project, Grays Harbor County, Washington.

Dear Ms. Gilson:

This letter responds to your February 27, 2023, request for initiation of consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and analysis because it met our screening criteria and contained all required information on, and analysis of, your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed the U.S. Department of Transportation Maritime Administration's (MARAD) 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 sections of the biological assessment (BA)for the Port of Grays Harbor Terminal 4 Expansion and Redevelopment Project (Anchor QEA, 2023):

- Section 1 for the project introduction, project overview, and action area;
- Section 2.4 for the project description;
- Section 2.7–2.9 for project timing, avoidance, minimization, and mitigation measures;
- Section 3.1 and 3.3–3.6 for status of the species and critical habitat information;
- Section 4 for environmental baseline conditions;
- Section 5 for the effects of the proposed action;
- Sections 6.2 and 6.4–6.7 for effects determinations for Chinook salmon, chum salmon, Pacific eulachon, green sturgeon, and Southern Resident killer whale; and
- Section 7 for the Essential Fish Habitat assessment.

The BA is available with the administrative record on file, available at the NMFS Oregon Washington Coastal Office in Lacey, Washington. This biological opinion is available through the NOAA Institutional Repository https://repository.library.noaa.gov/.

We note where we have supplemented information in the BA with our own data and analysis.

**Consultation History**
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 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.

On February 27, 2023, the MARAD sent a letter requesting formal consultation for the project along with the BA to NMFS. Their BA concluded "LAA" for green sturgeon, and NLAA for SRKW, CR Chum, LCR Chinook salmon and UWR Chinook salmon.

On March 1, 2023, the NMFS attended a pre-application meeting for the proposed action.

On March 7, 2023, the NMFS met with the applicants at the project site in Aberdeen/Hoquiam, Washington.

On May 22, 2023, the NMFS notified the MARAD that the consultation package was complete and initiated the consultation.

**Proposed Action**
Based on Section 1 of the BA, the Port of Grays Harbor (Port) proposes to conduct several actions under their Terminal 4 (T4) Expansion and Redevelopment Project (Project). This project is proposed to expand the rail and shipping capacity at the Port's T4 facility to accommodate the growth of dry bulk, break bulk, and roll-on/roll-off cargos.

According to Section 2.4 of the BA, the proposed Project consists of the following activities:

- Rail Upgrades & Site Improvements: Construction of new lead track, new storage tracks, new fencing and security guard station, rail bridge, access roads and secure site access, stormwater improvements, compensatory mitigation, and modification of existing storage track, and rail crossing modifications.
- Cargo Yard Relocation & Expansion: Filling of the former casting basin and upgrading surface treatments and drainage necessary to create a cargo laydown yard with a combination of paved and gravel surfaces.
- T4 Dock Fender & Stormwater Upgrades: Replacement of the existing timber-piled system with a modern pile-supported panel system at Berth A and modern suspended panel system at Berth B; and the construction of stormwater structural improvements designed to collect and transport runoff from the wharf to treatment facilities.

- AGP Project: Construction of a new railcar receiving building; a new three-tower ship loader with three spouts; landside motor control center; dock side motor control center buildings; bulk scale tower; and upgrades to water, sewer, electrical system and lighting systems.

The proposed action also includes compensatory mitigation measures. This framework can be found in Section 2.9 of the BA. The Port proposes mitigation measures that involve the re-establishment of wetland habitat, habitat rehabilitation or enhancement, and creosote pile removal.

The avoidance and minimization measures can be found in Section 2.8 of the BA. The avoidance and minimization measures address and minimize possible instances of incidental take of ESA-listed salmonids, eulachon and green sturgeon. These include procedures to retrieve debris during construction, use of a bubble curtain during impact pile driving, and standard practices to minimize the risk of and quickly clean up hazardous material or fuel spills. Additionally, all in-water work would occur within the approved in-water work window (IWWW) of July 16 through February 15.

**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 project site is located along the Pacific Coast in Grays Harbor County, Washington. The BA describes the action area in Section 1.2 and in Section 5.3–5.4. The overall action area is the geographic extent of all the project effects, which includes a terrestrial and aquatic component. The BA determined that the loudest of the proposed project activities is the impact installation of 36-inch steel pipe piles in both the terrestrial and aquatic components. The extent of the action area is defined as the distance at which noise produced by the action attenuates to ambient conditions. Based on the industrial nature of the project site, ambient in-air sound levels were estimated at approximately 60 decibels (dB), while underwater ambient sound levels approximately 120 dB. As identified in the BA, using the spherical spreading loss model, construction noise is expected to attenuate to baseline noise levels within 15,811 feet (3 miles) from the project area. Using the practical spreading loss model, underwater noise generated by the proposed action has the potential to extend 212 miles from the site. However, the presence of shorelines shortens the distance to a 3.8-mile area extending northwestward from the project site.

**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.

Table 1 of the BA shows the ESA-listed species that may be present within the action area and their critical habitat status. The ESA-listed species that may be affected by the proposed action include:

- Southern Distinct Population Segment (DPS) of green sturgeon (*Acipenser medirostris*);

- Lower Columbia River (LCR) and Upper Willamette River (UWR) Chinook salmon (*Oncorhynchus tshawytscha*);
- Columbia River (CR) chum salmon (*O. keta*);
- Southern DPS of Pacific eulachon (*Thaleichthys pacificus*);
- Southern Resident killer whale (SRKW) (*Orcinus orca*).

The BA summarizes the status of these ESA-listed species and their critical habitat along with their biology, distribution, and a description of their utilization of the action area in Section 3.1 and 3.3–3.6.

We supplement the BA's presentation of status of species and critical habitat with information summarized in the following two tables. Table 1 below provides a summary of listening 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, Evolutionarily Significant Unit (ESU), Interior Columbia Technical Recovery Team (ICTRT), Multiple Population Grouping (MPG), Northwest Fisheries Science Center (NWFSC), Technical Recovery Team (TRT), and Viable Salmonid Population (VSP).

**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 |
|---|---|---|---|---|---|
| LCR Chinook salmon | Threatened 06/28/05 | (NMFS, 2013) | (NMFS, 2022a; Ford, 2022) | This ESU comprises 32 independent populations. Relative to baseline VSP levels identified in the recovery plan (Dornbusch 2013), there has been an overall improvement in the status of a number of fall-run populations although most are still far from the recovery plan goals; Spring-run Chinook salmon populations in this ESU are generally unchanged; most of the populations are at a "high" or "very high" risk due to low abundances and the high proportion of hatchery-origin fish spawning naturally. Many of the populations in this ESU remain at "high risk," with low natural-origin abundance levels. Overall, we conclude that the viability of the Lower Columbia River Chinook salmon ESU has increased somewhat since 2016, although the ESU remains at "moderate" risk of extinction. | • Reduced access to spawning and rearing habitat<br>• Hatchery–related effects<br>• Harvest related effects on fall Chinook salmon<br>• An altered flow regime and Columbia River plume<br>• Reduced access to off–channel rearing habitat<br>• Reduced productivity resulting from sediment and nutrient–related changes in the estuary<br>• Contaminant |
| UWR Chinook salmon | Threatened 06/28/05 | (NMFS, 2011) | (NMFS, 2016; Ford, 2022) | This ESU comprises seven populations. Abundance levels for all but Clackamas River DIP remain well below their recovery goals. Overall, there has likely been a declining trend in the viability of the Upper Willamette River Chinook salmon ESU since the last review. The magnitude of this change is not sufficient to suggest a change in risk category, however, so the Upper Willamette River Chinook salmon ESU remains at "moderate" risk of extinction. | • Degraded freshwater habitat<br>• Degraded water quality<br>• Increased disease incidence<br>• Altered stream flows<br>• Reduced access to spawning and rearing habitats<br>• Altered food web due to reduced inputs of microdetritus<br>• Predation by native and non-native species, including hatchery fish<br>• Competition related to introduced salmon and steelhead<br>• Altered population traits due to fisheries and bycatch |

| Species | Listing Classification and Date | Recovery Plan Reference | Most Recent Status Review | Status Summary | Limiting Factors |
|---|---|---|---|---|---|
| CR chum salmon | Threatened 6/28/05 | (NMFS, 2013) | (NMFS, 2022a; Ford, 2022) | This species has 17 populations divided into 3 MPGs. 3 populations exceed the recovery goals established in the recovery plan (Dornbusch 2013). The remaining populations have unknown abundances. Abundances for these populations are assumed to be at or near zero. The viability of this ESU is relatively unchanged since the last review (moderate to high risk), and the improvements in some populations do not warrant a change in risk category, especially given the uncertainty regarding climatic effects in the near future. | • Degraded estuarine and nearshore marine habitat<br>• Degraded freshwater habitat<br>• Degraded stream flow as a result of hydropower and water supply operations<br>• Reduced water quality<br>• Current or potential predation<br>• An altered flow regime and Columbia River plume<br>• Reduced access to off-channel rearing habitat in the lower Columbia River<br>• Reduced productivity resulting from sediment and nutrient-related changes in the estuary<br>• Juvenile fish wake strandings<br>• Contaminants |
| Southern DPS of Pacific eulachon | Threatened 3/18/10 | (NMFS, 2017c) | (NMFS, 2022j) | The Southern DPS of eulachon includes all naturally-spawned populations that occur in rivers south of the Nass River in British Columbia to the Mad River in California. Sub populations for this species include the Fraser River, Columbia River, British Columbia and the Klamath River. In the early 1990s, there was an abrupt decline in the abundance of eulachon returning to the Columbia River. Despite a brief period of improved returns in 2001-2003, the returns and associated commercial landings eventually declined to the low levels observed in the mid-1990s. Although eulachon abundance in monitored rivers has generally improved, especially in the 2013-2015 return years, recent poor ocean conditions and the likelihood that these conditions will persist into the near future suggest that population declines may be widespread in the upcoming return years | • Changes in ocean conditions due to climate change, particularly in the southern portion of the species' range where ocean warming trends may be the most pronounced and may alter prey, spawning, and rearing success.<br>• Climate-induced change to freshwater habitats<br>• Bycatch of eulachon in commercial fisheries<br>• Adverse effects related to dams and water diversions<br>• Water quality,<br>• Shoreline construction<br>• Over harvest<br>• Predation |

| Species | Listing Classification and Date | Recovery Plan Reference | Most Recent Status Review | Status Summary | Limiting Factors |
|---|---|---|---|---|---|
| Southern DPS of green sturgeon | Threatened 4/07/06 | (NMFS, 2018) | (NMFS, 2021) | The Sacramento River contains the only known green sturgeon spawning population in this DPS. The current estimate of spawning adult abundance is between 824-1,872 individuals. Telemetry data and genetic analyses suggest that Southern DPS green sturgeon generally occur from Graves Harbor, Alaska to Monterey Bay, California and, within this range, most frequently occur in coastal waters of Washington, Oregon, and Vancouver Island and near San Francisco and Monterey bays. Within the nearshore marine environment, tagging and fisheries data indicate that Northern and Southern DPS green sturgeon prefer marine waters of less than a depth of 110 meters. | • Reduction of its spawning area to a single known population<br>• Lack of water quantity<br>• Poor water quality<br>• Poaching |
| Southern Resident killer whale | Endangered 11/18/05 | (NMFS, 2008) | (NMFS, 2022k) | The Southern Resident killer whale DPS is composed of a single population that ranges as far south as central California and as far north as southeast Alaska. While some of the downlisting and delisting criteria have been met, the biological downlisting and delisting 63 criteria, including sustained growth over 14 and 28 years, respectively, have not been met. The SRKW DPS has not grown; the overall status of the population is not consistent with a healthy, recovered population. Considering the status and continuing threats, the Southern Resident killer whales remain in danger of extinction. | • Quantity and quality of prey<br>• Exposure to toxic chemicals<br>• Disturbance from sound and vessels<br>• Risk from oil spills |

**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 |
|---|---|---|
| Southern DPS of green sturgeon | 10/09/09<br>74 FR 52300 | Critical habitat has been designated in coastal U.S. marine waters within 60 fathoms depth from Monterey Bay, California (including Monterey Bay), north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento River, lower Feather River, and lower Yuba River in California; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; tidally influenced areas of the Columbia River estuary from the mouth upstream to river mile 46; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor), including, but not limited to, areas upstream to the head of tide in various streams that drain into the bays. Several activities threaten the PBFs in coastal bays and estuaries and need special management considerations or protection. The application of pesticides, activities that disturb bottom substrates/ adversely affect prey resources/ degrade water quality through re-suspension of contaminated sediments, commercial shipping and activities that discharge contaminants and result in bioaccumulation of contaminants in green sturgeon; disposal of dredged materials that bury prey resources; and bottom trawl fisheries that disturb the bottom/prey resources for green sturgeon. |

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.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats in the Pacific Northwest. These changes will not be spatially homogeneous across the area. 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 (2010's) 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). Much 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 4$^{th}$ warmest) (NOAA NCEI, 2022). Events such as the 2013–2016 marine heatwave 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; Jacox 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). The 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 & 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 have collected hundreds of papers documenting the major themes relevant for salmon (Crozier, 2015, 2016, 2017; Crozier & Siegel, 2018; Siegel & Crozier, 2019, 2020). 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 fires, and insect outbreaks (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.

*<u>Freshwater Environments</u>*

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 SRB. 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., 2021; 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 a climate change refuge for several 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). 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 enough 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. 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 several 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

(Ou et al., 2015; 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 stream-flows) 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 locations where the greatest warming occurs may affect egg survival. Although, several factors impact inter-gravel 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., 2021). 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 CR. 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 and Atlantic salmon also have demonstrated synchrony in productivity across a broad latitudinal range (Stachura el al., 2014; Olmos et al., 2020).

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 & 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 & Zabel, 2006; Crozier et al., 2010, 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 MCR than those from the SRB. 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, though the low levels of remaining diversity present challenges to this effort (Anderson et al., 2015; Freshwater, 2019). Salmon historically maintained relatively consistent returns across variation in annual weather through the portfolio effect, in which different populations are sensitive to different climate drivers. Applying this concept to climate change, emphasized the additional need for populations with different physiological tolerances (Anderson et al., 2015; Schindler et al., 2015). 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).

Section 3.1 of the BA confirms the presence of green sturgeon in Grays Harbor and is included as designated critical habitat for the species. Adult green sturgeon can be commonly found in the seawater and mixing zones in the area year-round. Their presence increases starting in July into early October where subadults and adults aggregate in Grays Harbor to forage. Sections 3.3–3.6 of the BA indicate that other ESA-listed species do not have designated critical habitat in Grays Harbor and are less likely to be present during construction. However, unlisted salmonids are more likely to utilize the estuarine environments of Grays Harbor.

The BA describes the environmental baseline of Grays Harbor in Section 4. This section discusses historical use of the area and current environmental conditions such as annual maintenance dredging, vessel traffic, vegetation, and water and sediment quality. The Washington Department of Ecology's (Ecology) Water Quality Atlas indicates Clean Water Act Section 303(d) listings for temperature, dissolved oxygen, and fecal coliform bacteria in the upper portion of Grays Harbor. Sediment samples analyzed by Ecology identify that the sediments near the project area are contaminated with detectable concentrations or arsenic, chromium, copper, lead, and other contaminants. However, the levels detected in Grays Harbor are low relative to the established biological effect threshold. Regarding refugia, aquatic habitat is limited in the project area due to ongoing activity at the Port. Other nearshore areas of Grays Harbor consist of dune grass, eelgrass, and salt marsh habitats while deep-water zones provide migratory habitat.

**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 BA provides a detailed discussion and comprehensive assessment of the effects of the proposed actions in Section 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 Port proposes to conduct their Project which includes several construction activities as summarized in the Proposed Action section of this opinion. Temporary and long-term effects of the proposed actions can be found below:

- Temporary and localized noise disturbance generated from vibratory pile installation and removal, along with impact pile driving.
- Temporary and localized turbidity during pile removal and installation and other proposed actions.
- Long-term water quality impacts due to stormwater discharge.
- Long-term water quality improvements from creosote pile removal.

For the convenience of the reader, we summarize the effects analysis found in Section 5 of the BA here:

- Parts of the proposed action including construction of the bridge over Fry Creek, roads and stormwater facilities, culvert extension/replacement, dock removal/upgrades and pile removal and installation are likely to generate excess turbidity. Suspended sediment can affect ESA-listed fish by causing physiological stress, gill tissue damage, behavioral changes and direct mortality. However, the impacts of increased sediment are expected to be minor, localized and temporary with well below known impact levels to species.
- All the proposed vibratory and impact pile driving would result in the generation of underwater noise. Pile driving activities would be associated with the replacement of the fender pile system and the installation of the ship loader at T4. This elevated noise may result in the alteration of individual fish behavior, and could result in the injury or death of fish. However, sound pressure waves produced from impact pile driving have more potential to result in the injury or death of fish. The vibratory removal and installation of piles do not create intense sounds that can cause injury and death to fish but sound levels would be enough to cause a behavioral response. Effects resulting from pile driving are expected to be temporary and localized and as a result of the presence of Rennie Island, the extent of the distance sound will travel underwater is limited.
- As compensatory mitigation, an aspect of the proposed action includes creosote pile removal. Timber treated with creosote contain toxic and carcinogenic compounds that can leach into the aquatic habitat. The removal of these creosote treated piles would reduce the availability of toxic compounds in the aquatic habitat in the action area.

We supplement the BA analysis of stormwater effects in Section 5 as follows. Stormwater runoff is a major contributing factor to water quality impairments throughout Washington State (EPA, 2020). Impermeable surfaces, such as roads and industrial structures, alter the natural infiltration of vegetation and soil, causing runoff to accumulate many contaminants. Stormwater outfalls ultimately discharge stormwater into aquatic habitat, introducing a complex mixture of compounds, some of which have not been identified in terms of their adverse environmental effects (Du et al., 2017; Peter et al., 2018).

The BA indicates that the proposed stormwater improvements would incorporate vegetated filtration as a method for filtering stormwater. Vegetated filtration methods can collect and convey stormwater in ways that filter water through imported soils containing large amounts of organic matter that bind or otherwise remove contaminants from the stormwater before it reaches aquatic habitat (McIntyre et al., 2015). A study by Fairbairn et al. (2018) found 123 contaminants of concern contained in stormwater samples. Through the treatment of these stormwater samples vi iron enhanced sand filters, a significant number of these environmentally harmful compounds were removed. The proposed stormwater improvements would reduce the number of contaminants released into the harbor compared to effluent currently released. However, despite the improvement, we expect the effluent would still contain some contaminants, such as metals, PAHs and 6PPD/6PPD-quinone.

There have been reports identifying concentrations of metals and pesticides in the blood plasma of green sturgeon from Grays Harbor (Layshock et al., 2022). Copper and selenium concentrations ranged from 100 to 1000 nanograms per milliliter and 200 to 400 nanograms per milliliter respectively. Pesticide concentrations ranged from 2–10 nanograms per milliliter of blood plasma (Layshock et al., 2022). Although metals and pesticides have known toxic effects in green sturgeon, the toxicity threshold for blood plasma concentrations of these compounds is unknown for green sturgeon. In addition, the relationship between green sturgeon blood plasma concentrations and their external exposure to certain concentrations of these compounds is unknown. Therefore, there is a possibility that the effluent released into the harbor may still expose green sturgeon to the contaminants remaining after treatment that add to their baseline blood plasma concentrations and increase toxicity. We expect any possible increases in green sturgeon blood toxicity to be minimal.

As presented in Section 6 of the BA, critical habitat is not designated for LCR or UWR Chinook salmon, CR chum, eulachon or SRKW in the action area. Effects of the proposed action on critical habitat for these species is discountable.

Eulachon occur rarely in the action area, and exposure to project effects is discountable. We concur with the BA that this species is NLAA.

SRKW are unlikely to be present in the action area, and we consider exposure to project effects to be discountable. Their critical habitat is outside of the action though Chinook salmon and chum are a biological feature of designated critical habitat (prey). We concur with the BA that this species is NLAA, and the critical habitat is also NLAA because effects on forage as a PBF are insignificant.

We disagree with the conclusions in Section 6.4-6.5 that exposure and response of listed salmonids is discountable because migration patterns of juveniles along nearshore areas can bring some fish briefly into the action area. The in-water work window is July 16- February 15, with up to 36 days of pile driving work. Based on outmigration timing from the Columbia River, some juveniles could have migrated along the shore and entered the harbor, thus they could be present during work, though we expect presence in low numbers. Exposure and response to vibratory driving could result in behavioral responses that impair these juveniles from detecting both prey and predators. Exposure and response to impact driving, even with BMPs employed could result in injury or death of a very low number of fish present in the action area, as the zone where this type of response occurs is quite close to the pile driving (450 meters radially, based on the assumption that any juvenile salmon present will be larger than 2 grams in size). Salmonids that transit through the action area in any future year that are exposed to stormwater are expected to have only brief exposure, with sublethal or latent responses that could be detrimental but that are hard to detect and difficult to attribute to this specific proposed action.

**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.

Materials in the initiation package did not address cumulative effects in the project area. Therefore, NMFS is including the following information on cumulative effects in the action area. 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. Anticipated non-federal effects likely to occur in the action area are increased input of nonpoint pollution as upland land uses intensify, and recreational uses from a growing human population. These effects and climate change effects are expected to exert continuing negative pressure on habitat conditions and species over time.

**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.

Each species considered in this opinion is listed as threatened with the exception of SRKW, which is listed as endangered. These species are listed under the Endangered Species Act because of reductions in abundance from historic levels, low productivity, reductions in diversity and diminishment in spatial structure. These conditions are due in part to systemic degraded habitat as factors for decline and/or limiting factors, which is described briefly in the status of critical habitat and similarly found in the baseline of the action area, where multiple anthropogenic changes exist.

We add to this the effects of the proposed action on species. As described in the BA and briefly presented above in this document, there are two short term effects and two long term effects. The short-term effects will range from behavioral responses that may increase predation risk (from vibratory driving and suspended sediment), to injury or death (from impact driving). The long-term effects include expected sublethal responses to stormwater discharge, and also some health or fitness improvements from the removal of creosote which should incrementally improve water quality.

We also consider the proposed actions added effects on critical habitat. The temporary effects diminish conditions for rearing and migration of ESA listed fish but promptly return to baseline levels so that we do not consider these adverse effects to reduce the conservation value of the action area. The long-term effects when considered together appear neutral with regard to water quality, with both some negative and some positive effects. The conservation value of the action area is not impaired.

**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:

- Southern Distinct Population Segment (DPS) of green sturgeon (*Acipenser medirostris*);
- Lower Columbia River (LCR) and Upper Willamette River (UWR) Chinook salmon (*Oncorhynchus tshawytscha*);
- Columbia River (CR) chum salmon (*O. keta*);
- Southern DPS of Pacific eulachon (*Thaleichthys pacificus*);
- Southern Resident killer whale (SRKW) (*Orcinus orca*);

or destroy or adversely modify the designated critical habitat of green sturgeon.

## INCIDENTAL TAKE STATEMENT

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

**Amount or Extent of Take**
In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Harassment of juvenile salmonids and green sturgeon from vibratory driving for installation and removal. The extent of take is 90 total piles (50 wood piles to be removed and 40 steel piles to be installed). This is an observable metric causally linked to the form of take because increasing the number of piles driven would increase the duration of vibratory noise and increase the likely exposure of listed fish.

Injury or death of juvenile salmonids, and harm of green sturgeon, from impact pile driving necessary for proofing after vibratory installation. The extent of take is up to 40 steel piles to be installed (15, 18-inch and 25, 30-inch). This is an observable metric causally linked to the form of take because increasing the number of piles that are driven with an impact driver will increase the duration of injurious sound level and increase the likely exposure of listed fish.

Harm of juvenile salmonids and green sturgeon from stormwater. The extent of harm from stormwater is the amount of impervious surface that generates stormwater directed to treatment, which here is 7.0 acres with no new impervious surface added. This is an observable metric causally linked to the form of take because additional impervious surface generates more stormwater contaminated with chemicals and compounds known to be injurious to aquatic life including listed fishes. If new impervious is added so that the 7 acres is exceeded, this is a metric which may require re-initiation.

**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). The Port of Grays Harbor shall:

1. Minimize take from pile work.

2. Minimize take from stormwater.

3. Prepare and provide NMFS with a report describing how impacts of the incidental take on listed species in the action area were monitored and documented.

**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 MARAD 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 term and condition implements reasonable and prudent measure 1:
    a. Employ the bubble curtain and block to reduce peak sound pressure when impact driving occurs with any size steel pile.

2. The following terms and conditions implement reasonable and prudent measure 2:
    a. Install an enhanced stormwater treatment method or system at the T4B (AGP Facility) drainage basin. The Washington State Department of Ecology provides a list of enhanced methods from which to choose a system suitable to the site.
    b. Do not create new additional impervious surface without commensurate treatment of stormwater.

3. The following terms and conditions implement reasonable and prudent measure 3:
    a. Make 2 daily visual inspections during impact pile driving to observe, injured, or killed fish.
    b. Make 2 daily visual inspections during vibratory driving/removal to observe distressed fish or observance of unusual presence of avian piscivores.
    c. Provide a post construction report to projectreports.wcr@noaa.gov within 3 months of project completion that documents results
        i. Results of observations per 3a. and 3b.
        ii. The final number of piles installed and removed
        iii. The stormwater treatment method implemented

**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).

NMFS recommends identifying locations where pollution generating impervious surface is suitable to be retrofitted with pervious pavement and incorporating that into the Port's capital plan.

NMFS recommends as an alternative to the above, identifying locations where paved areas can be retrofitted with vegetated stormwater swales as part of a comprehensive plan for water quality treatment, and incorporating this into the Port's capital plan.

**Reinitiation of Consultation**

Reinitiation of consultation is required and shall be requested by [*name of action agency*] 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.

## MAGNUSON STEVENS ACT ESSENTIAL FISH HABITAT CONSULTATION

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.

MARAD indicated that the proposed action would adversely affect the EFH of Pacific Salmon and Coastal Pelagics, and Pacific Coast Groundfish. The adverse effects are described at Section 7 (pages 102 and 103) of the BA and are incorporated here by reference. We reiterate these briefly:

- Briefly disrupted aquatic conditions from sound during pile driving.
- Briefly diminished water quality from turbid conditions during pile driving.
- Episodically diminished water quality from stormwater discharges.

NMFS notes that MARAD offered conservation recommendations to minimize effects associated with pile driving which we find appropriate:

1. Encircle piles with a silt curtain prior to pile driving where conditions allow to reduce the area of suspended sediment/

2. Drive piles if possible at low tide to reduce the transmission of sound.

3. Include greater use of pervious pavements or increase use of infiltration as part of the Port's capital plan, where conditions allow.

**Please provide a response within 30 days** to NMFS if either of these conservation recommendations will be employed, and if not provide a reason why these are not feasible. Provide this email to the owco.wa.consultationrequest@noaa.gov inbox and be sure to include the WCRO 2023-00189 tracking number in the regarding line.

## 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 A complete record of this consultation is on file at the Lacey, Washington, office of the Oregon Washington Coastal Office.

Please contact Bonnie Shorin at bonnie.shorin@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