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

**Refer to NMFS No:**
**WCRO-2022-01084**

August 25, 2023

Todd Tillinger
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Seattle District
4735 East Marginal Way South, Bldg. 1202
Seattle, Washington 98134-2388

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Paradise Shore Estates Marina Dock Replacement on Mason Lake in Grapeview, Mason County, Washington (NWS-2021-644)

Dear Mr. Tillinger:

Thank you for your letter of May 3, 2022, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for Paradise Shore Estates Marina dock replacement on Mason Lake in Grapeview, Mason County, Washington (Lat/Long 47.328818, -122.954724).

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)) for this action. It is included in Section 3 of this document. NMFS determined that the proposed project will adversely affect EFH for salmon species. Therefore, we have included the results of that review in Section 3 of this document.

NMFS has concluded the proposed action, is likely to adversely affect Puget Sound (PS) steelhead species and steelhead critical habitat, but not jeopardize this species or adversely modify its designated critical habitat. NMFS also concludes the proposed action is not likely to adversely affect PS Chinook salmon or Hood Canal Summer Run chum or their critical habitat.

Please contact Nissa Rudh of the Central Puget Sound Branch in Lacey, Washington, at 360-701-9699 or at Nissa.Rudh@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: Colin Greenan, USACE
Rory Lee, USACE
Velinda Brown, Paradise Marina Committee Chair
Kip Miller, Parardise Marina Committee Co-Chair

**Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion [and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the**

Paradise Shore Estates Marina Dock Replacement
Mason Lake in Grapeview, Mason County, Washington
(NWS-2021-644)

**NMFS Consultation Number:** WCRO-2022-01084

**Action Agency**: United States Department of the Army, Corps of Engineers

**Affected Species and NMFS' Determinations:**

| ESA-Listed Species | Status | Is Action Likely to Adversely Affect Species? | Is Action Likely to Jeopardize the Species? | Is Action Likely to Adversely Affect Critical Habitat? | Is Action Likely to Destroy or Adversely Modify Critical Habitat? |
|---|---|---|---|---|---|
| Puget Sound Steelhead (*Oncorhynchus mykiss)* | Threatened | **Yes** | No | **Yes** | NA |
| Puget Sound Chinook (*O. tshawytscha)* | Threatened | No | No | No | No |
| Hood Canal Summer Run Chum (*O. keta*) | Threatened | No | No | No | No |

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

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

**Issued By:**

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

**Date:** August 25, 2023

## TABLE OF CONTENTS

# 1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

## 1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR part 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the NMFS Office in Lacey, Washington.

## 1.2. 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.

May 3, 2022: NMFS received a request for informal consultation from USACE on the Paradise Cove/Mason lake marina replacement project. It was assigned a NMFS consultation number: WCRO-2022-01084.

August 8, 2022: Nissa Rudh (NR) was assigned as consulting biologist.

Sept 16, 2022: NMFS suggested that the informal consultation request be withdrawn and resubmitted as a formal consultation due to effects on PS steelhead and their critical habitat.

Sept 19, 2022: COE withdrew the original consultation request and requested a formal consultation from NMFS for this project.

Between October 25, 2022 and June 2 2023, NMFS and the Corps had multiple electronic and spoken exchanges to identify project details and effects, and potential project revisions to reduce effects.

June 5, 2023: Received project updates including and expanded planting plan, and a revised proposed action that includes wrapped piles.

July 18, 2023: Received an email from the applicant that the Washington Department of Fish and Wildlife allowed for an extension of the in-water work window with their permit, from July 1 to September 30, 2023. If work is completed in subsequent years under the Corps' permit, the standard work window of July 1- August 15 would apply. The Applicant indicated they may use Douglas fir piles instead of epoxy coated galvanized piles.

August 7, 2023: NR reviewed all materials, determined them sufficient, and initiated consultation.

August 8, 2023: NR clarified details to the applicant regarding galvanized piles, epoxy coating, and the IWWW for this project.

### 1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). Under MSA, federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded or undertaken by a federal agency (50 CFR 600.910).

The USACE (Corps) proposes to permit, under section 404 of the clean water act and section 10 of the rivers and harbors act, repair and replacement of floats, docks, piles and a boat ramp at the Paradise Marina., in Mason Lake, Mason County Washington (47.328818, -122.954724). The proposed action also includes armoring removal and native plantings on site, proposed by the applicant, Paradise Service Associates.

See Figures 1 through 5 below for the relative location proposed elements of Paradise Marina in Mason Lake.


**Figure 1**. Google Earth satellite imagery of Paradise Marina taken during August 2022.

We considered, under the ESA, whether the proposed action would cause any other activities and determined that it would allow for continued use of boats on Mason Lake, at a reduced rate – down from 95 slips to 61.

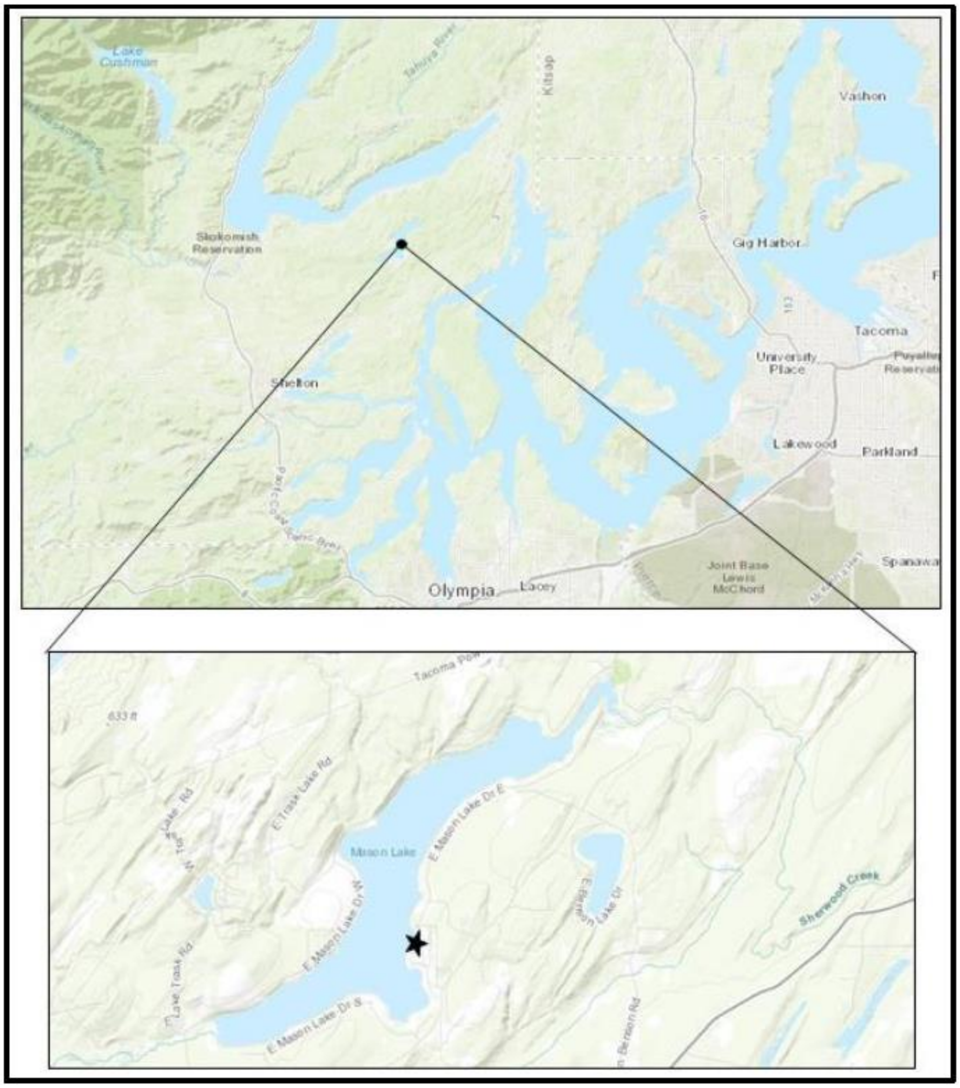


**Figure 2**. Paradise Marina on Mason Lake. Mason Lake is between Hood Canal and South Central Puget Sound but connects hydrologically via Sherwood Creek to the South Central Puget Sound at Allyn, WA.

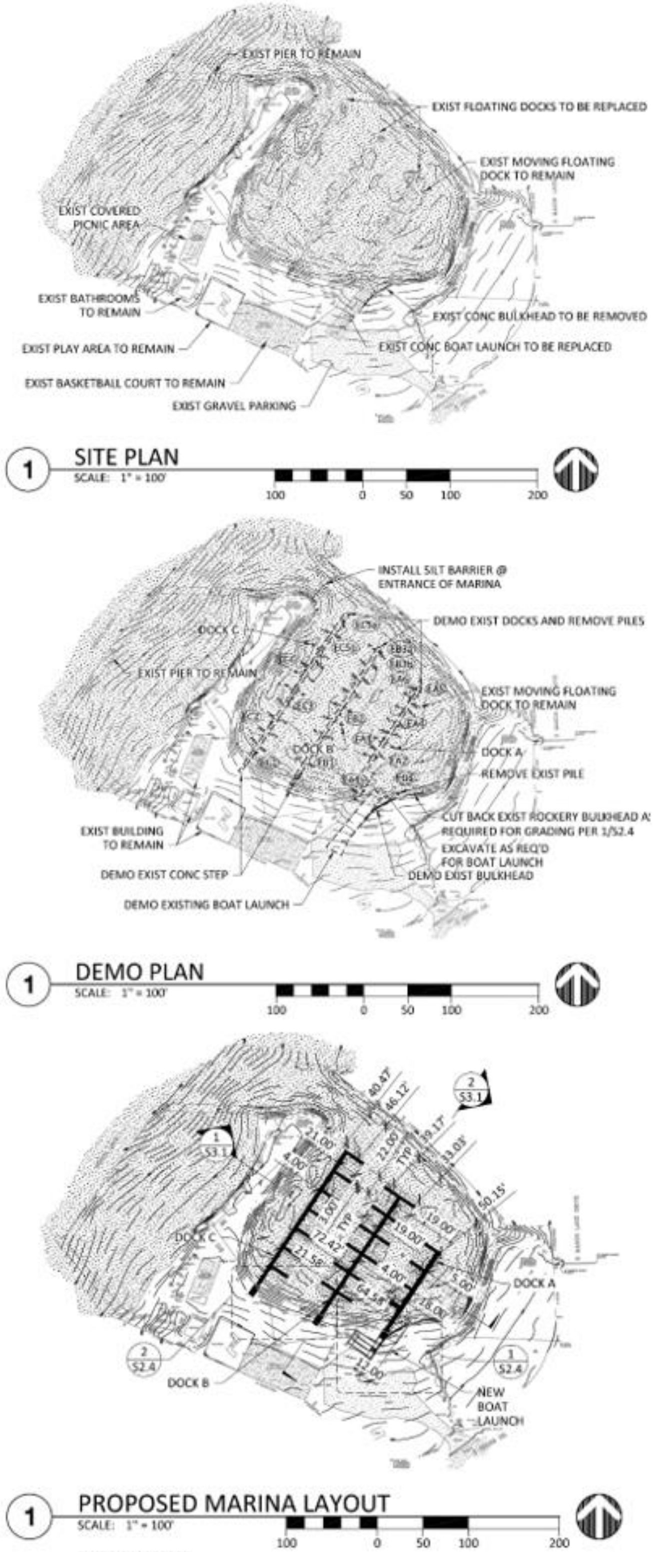


**Figure 3**. Existing (top), Demolition plan (middle), and Proposed (bottom) marina conditions.

**Figure 4.** Site photos at Paradise Estates Marina from the ground showing existing ramp, floats, piles, and retaining wall.

**Marina Float System Replacement**

The proponent intends to replace all existing floating docks, piles, gangways and abutments at the Paradise Shore Estates Marina. Existing docks are significantly deteriorated and require full replacements to provide safe and lasting services for the community. The project proposes to reconstruct the three docks to accommodate 61 moorage slips, down from 95. Currently the marina floats and gangways are 3,154 square feet of overwater coverage, and the new design will cover 3,123 square feet.

Replacement float decking will have 50% grating with a minimum of 60% open area. Floats will be foam encased by an ultra violet resistant polyethylene. Lumber used for the construction of the floats would be treated with ACZA preservative to a treatment level of 0.4lb / cubic foot. Three concrete abutments on shore (one to each mooring dock) will cover 72 sq ft each and be made of concrete. The attached gangways will be 4 feet wide, 15 feet long and made with 100% fiberglass grating.

A total of 17 piles will be removed from the cove. These range from 6-14 inches in diameter and are made of varying materials; treated wood, galvanized steel, and concrete filled corrugated plastic. Ten replacement 10" diameter piles will be either epoxy coated galvanized steel, stainless steel, or untreated Douglas fir. Each pile will have a fiberglass bird cap. Piles will be driven with a vibratory hammer.

**Boat Ramp Replacement and Retention Wall Removal:**

The proposed action includes the removal of the current 1,192 sqft concrete ramp and replacement with smaller 901 sqft ramp to the east of the current location. The new ramp will have an added 483 sqft ADA accessible ramp and 60 sqft landing on the west side. The lower half of the launch will be 4" thick pre-cast concrete slabs and the upper half will be a 6" thick cast-in-place slab. This side will not come in contact with the water during construction.

A 70 linear foot retaining wall to the east of the extant boat launch will be demolished and the new ramp will be built in its place. The shore adjacent to the new launch will not have any armoring. It will be regraded and planted per the planting plan (see below).

**Native Riparian Plantings**

The project proponent included 1,450 square feet of plantings proposed in an area that is currently mowed lawn and some impervious surface associated with the boat ramp. The attached Figure shows the proposed planting plan. The plantings will incorporate 170 shrubs, consisting of four different species, 4 trees and 10 willows. The shrubs will be planted 4' on center, willow 5 to 10' on center, and trees 10' on center. The species will be selected from the Corps RAP plant list.

The actual species may differ based on availability. Replacement species should be native to the Pacific Northwest and demonstrated to provide erosion control and slope stabilization such as those found at: https://www.masoncd.org/uploads/3/1/5/9/31598011/tam_15_conservation_landscaping_v2s_4.pdf Plants will be able to sustain sunlight. Optimum time for planting is from February to March. Maintenance of planted areas will include weeding and watering as necessary to ensure plant survival for up to one year after the date of installation. Within one month following the planting, an As-built report will be created to show the outcome of the installation process of the plants. The report will include the following:

- Quantities of plants
- Spacing of plantings
- Name of species of plants
- Notes and photographs of the installation

Monitoring will be provided annually to the Corps for 5 years following planting.


**Figure 5.** Proposed site riparian planting plan.

**<u>Proposed Minimization Measures</u>**

- The proponent intends to work within an WDFW approved extended work window July 1, 2023 – September 30, 2023. If the work is completed in subsequent years under this Corps permit, the standard work window of July 1 to August 15 applies.
- The proponent will deploy a sediment curtain before work is conducted, to remain in place until all in-water work is completed, turbidity has completely subsided, and all debris is cleared from the water.
- The proponent will stage construction materials and equipment on a barge or workboat that will not be allowed to ground. Piles will be installed by a vibratory pile driver. Galvanized steel or untreated wood piles may be installed. Galvanized steel piles would be coated and/or wrapped with a polyurea or epoxy coating prior to being installed and shall be maintained to prevent the flaking/shedding of plastic material into the bay.
- All construction debris shall be properly disposed of on land in such a manner that it cannot enter the waterway or cause water quality degradation (Section 13, river and Harbors Act).
- Construction equipment used for in- and near-water work will utilize non-toxic (vegetable based) hydraulic fluids, in case of spills, and will be re-fueled away from the shore.
- Spill avoidance and containment procedures and equipment will be in place, and a temporary erosion and sedimentation control plan, as detailed, will be implemented.

### 1.4. Action Area

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

The proposed project located is a small cove on the east side of Mason Lake. The cove was likely a historic backwater wetland that was excavated to create the marina.

The action area is determined by the outer boundary of any physical, chemical, or biological changes in the environment caused by the proposed action. Because, activities caused by the proposed action includes likely boating activity in all of Mason lake, NMFS considers the full action area to be Mason Lake, though construction effects and effects of the structures are constrained to the marina.

# 2. ENDANGERED SPECIES ACT BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

The Corps determined the proposed action is not likely to adversely affect Puget Sound Chinook and Hood Canal Summer-run Chum. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (Section 2.13).

## 2.1. Analytical Approach

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

This biological opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation(s) of critical habitat for Puget Sound steelhead use(s) the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a “destruction or adverse modification” analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion we use the terms “effects” and “consequences” interchangeably.

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

- Evaluate the range-wide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

Information provided by the Corps that was used in the completion of this BO included: The Biological Assessment for the Proposed Paradise Estates Marina Dock Replacement (dated, September 2019), the Project Engineering Drawings (date May 4, 2022), and the Final Planting Plan, (dated Jun 15, 2021), and email communications with the Corps Project Manager and applicant contact (2022-2023)

For this consultation, NMFS also evaluated the project using the following publicly available resources to inform this Opinion:
SalmonScape –Washington Department of Fish and Wildlife's interactive, computer mapping system of salmon habitat data at https://apps.wdfw.wa.gov/salmonscape/map.html

Mueller, K. W. 1997 Mason Lake survey: the warmwater fish community of a lake Dominated by non-game fish. Washington Department of Fish and Wildlife. Warmwater Enhancement Program. Accessed via.
https://wdfw.wa.gov/sites/default/files/publications/00243/wdfw00243.pdf

Washington Department of Ecology Water Quality Assessment Tool at https://apps.ecology.wa.gov/waterqualityatlas/wqa/proposedassessment

Fishbrain.com: A publicly available social media style sharing app/site for documenting fish catches.

## 2.2. Rangewide Status of the Species and their Critical Habitat

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

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Major ecological realignments are already occurring in response to climate change (IPCC WGII, 2022). Long-term trends in warming have continued at global, national and regional scales. Global surface temperatures in the last decade (2010s) were estimated to be 1.09 °C higher than the 1850-1900 baseline period, with larger increases over land ~1.6 °C compared to oceans ~0.88 (IPCC WGI, 2021). The vast majority of this warming has been attributed to anthropogenic releases of greenhouse gases (IPCC WGI, 2021). Globally, 2014-2018 were the 5 warmest years on record both on land and in the ocean (2018 was the 4$^{th}$ 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).

### 2.2.1 Status of the Species

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).

*Status of PS Steelhead*
The PS Steelhead TRT produced viability criteria, including population viability analyses (PVAs), for 20 of 32 demographically independent populations (DIPs) and three major population groups (MPGs) in the DPS (Hard 2015). It also completed a report identifying historical populations of the DPS (Myers et al. 2015). The DIPs are based on genetic, environmental, and life history characteristics. Populations display winter, summer, or summer/winter run timing (Myers et al. 2015). The TRT concludes that the DPS is currently at "very low" viability, with most of the 32 DIPs and all three MPGs at "low" viability.

The designation of the DPS as "threatened" is based upon the extinction risk of the component populations. Hard 2015, identify several criteria for the viability of the DPS, including that a minimum of 40 percent of summer-run and 40 percent of winter-run populations historically present within each of the MPGs must be considered viable using the VSP-based criteria. For a DIP to be considered viable, it must have at least an 85 percent probability of meeting the viability criteria, as calculated by Hard (2015).

On December 27, 2019, we published a final recovery plan for PS steelhead (84 FR 71379) (NMFS 2019). The plan indicates that within each of the three MPGs, at least fifty percent of the populations must achieve viability, *and* specific DIPs must also be viable:

> Central and South Puget Sound MPG: Green River Winter-Run; Nisqually River Winter-Run; Puyallup/Carbon Rivers Winter-Run, or the White River Winter-Run; and at least one additional DIP from this MPG: Cedar River, North Lake Washington/Sammamish Tributaries, South Puget Sound Tributaries, or East Kitsap Peninsula Tributaries.
> Hood Canal and Strait of Juan de Fuca MPG: Elwha River Winter/Summer-Run; Skokomish River Winter-Run; One from the remaining Hood Canal populations: West Hood Canal Tributaries Winter-Run, East Hood Canal Tributaries Winter-Run, or South Hood Canal Tributaries Winter-Run; and One from the remaining Strait of Juan de Fuca populations: Dungeness Winter-Run, Strait of Juan de Fuca Tributaries Winter-Run, or Sequim/Discovery Bay Tributaries Winter-Run.
> North Cascades MPG: Of the eleven DIPs with winter or winter/summer runs, five must be viable: One from the Nooksack River Winter-Run; One from the Stillaguamish River Winter-Run; One from the Skagit River (either the Skagit River Summer-Run and Winter-Run or the Sauk River Summer-Run and Winter-Run); One from the Snohomish River watershed (Pilchuck, Snoqualmie, or Snohomish/Skykomish River Winter-Run); and One other winter or summer/winter run from the MPG at large.
> Of the five summer-run DIPs in this MPG, three must be viable representing in each of the three major watersheds containing summer-run populations (Nooksack, Stillaguamish, Snohomish Rivers); South Fork Nooksack River Summer-Run; One DIP from the Stillaguamish River (Deer Creek Summer-Run or Canyon Creek Summer-Run); and One DIP from the Snohomish River (Tolt River Summer-Run or North Fork Skykomish River Summer-Run)

Spatial Structure and Diversity**.** The PS steelhead DPS is the anadromous form of O. mykiss that occur in rivers, below natural barriers to migration, in northwestern Washington State that drain to Puget Sound, Hood Canal, and the Strait of Juan de Fuca between the U.S./Canada border and the Elwha River, inclusive. The DPS also includes six hatchery stocks that are considered no more than moderately diverged from their associated natural-origin counterparts: Green River natural winter-run; Hamma Hamma winter-run; White River winter-run; Dewatto River winter-run; Duckabush River winter-run; and Elwha River native winter-run (USDC 2014). Steelhead are the anadromous form of *Oncorhynchus mykiss* that occur in rivers, below natural barriers to migration, in northwestern Washington State (Ford 2011). Non-anadromous ‘‘resident’’ *O. mykiss* occur within the range of PS steelhead but are not part of the DPS due to marked differences in physical, physiological, ecological, and behavioral characteristics (Hard et al. 2007).

DIPs can include summer steelhead only, winter steelhead only, or a combination of summer and winter run timing (e.g., winter run, summer run or summer/winter run). Most DIPs have low viability criteria scores for diversity and spatial structure, largely because of extensive hatchery influence, low breeding population sizes, and freshwater habitat fragmentation or loss (Hard et al. 2007). In the Central and South Puget Sound and Hood Canal and Strait of Juan de Fuca

MPGs, nearly all DIPs are not viable (Hard 2015). More information on PS steelhead spatial structure and diversity can be found in NMFS' technical report (Hard 2015).

Abundance and Productivity. Abundance of adult steelhead returning to nearly all Puget Sound rivers has fallen substantially since estimates began for many populations in the late 1970s and early 1980s. Smoothed trends in abundance indicate modest increases since 2009 for 13 of the 22 DIPs. Between the two most recent five-year periods (2005-2009 and 2010-2014), the geometric mean of estimated abundance increased by an average of 5.4 percent. For seven populations in the Northern Cascades MPG, the increase was 3 percent; for five populations in the Central & South Puget Sound MPG, the increase was 10 percent; and for six populations in the Hood Canal & Strait of Juan de Fuca MPG, the increase was 4.5 percent. However, several of these upward trends are not statistically different from neutral, and most populations remain small. Inspection of geometric means of total spawner abundance from 2010 to 2014 indicates that 9 of 20 populations evaluated had geometric mean abundances fewer than 250 adults and 12 of 20 had fewer than 500 adults. Between the most recent two five-year periods (2005-2009 and 2010-2014), several populations showed increases in abundance between 10 and 100 percent, but about half have remained in decline. Long-term (15-year) trends in natural spawners are predominantly negative (NWFSC 2015).

There are some signs of modest improvement in steelhead productivity since the 2011 review, at least for some populations, especially in the Hood Canal & Strait of Juan de Fuca MPG. However, these modest changes must be sustained for a longer period (at least two generations) to lend sufficient confidence to any conclusion that productivity is improving over larger scales across the DPS. Moreover, several populations are still showing dismal productivity, especially those in the Central & South Puget Sound MPG (NWFSC 2015).

Little or no data is available on summer-run populations to evaluate extinction risk or abundance trends. Because of their small population size and the complexity of monitoring fish in headwater holding areas, summer steelhead have not been broadly monitored.

Limiting Factors. In our 2013 proposed rule designating critical habitat for this species (USDC 2013b), we noted that the following factors for decline for PS steelhead persist as limiting factors:

- The continued destruction and modification of steelhead habitat
- Widespread declines in adult abundance (total run size), despite significant reductions in harvest in recent years
- Threats to diversity posed by use of two hatchery steelhead stocks (Chambers Creek and Skamania)
- Declining diversity in the DPS, including the uncertain but weak status of summer run fish
- A reduction in spatial structure
- Reduced habitat quality through changes in river hydrology, temperature profile, downstream gravel recruitment, and reduced movement of large woody debris
- In the lower reaches of many rivers and their tributaries in Puget Sound where urban development has occurred, increased flood frequency and peak flows during storms and

reduced groundwater-driven summer flows, with resultant gravel scour, bank erosion, and sediment deposition

- Dikes, hardening of banks with riprap, and channelization, which have reduced river braiding and sinuosity, increasing the likelihood of gravel scour and dislocation of rearing juveniles

### 2.2.2 Status of the Critical Habitat

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

*Status of PS Steelhead Critical Habitat*
Critical habitat for Puget Sound steelhead includes 2,031 stream miles. Nearshore and offshore marine waters were not designated for this species. There are 66 watersheds within the range of this DPS. Nine watersheds received a low conservation value rating, 16 received a medium rating, and 41 received a high rating to the DPS.

Salmon and Steelhead. For salmon and steelhead, NMFS ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code ($HUC_5$) in terms of the conservation value they provide to each listed species they support.[1] The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, NMFS's critical habitat analytical review teams (CHARTs) evaluated the quantity and quality of habitat features (for example, spawning gravels, wood and water condition, side channels), the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area (NOAA Fisheries 2005). Thus, even a location that has poor quality of habitat could be ranked with a high conservation value if it were essential due to factors such as limited availability (*e.g.*, one of a very few spawning areas), a unique contribution of the population it served (*e.g.*, a population at the extreme end of geographic distribution), or if it serves another important role (*e.g.*, obligate area for migration to upstream spawning areas). The primary constituent elements for and steelhead are identified in Table 1 below.

[1] The conservation value of a site depends upon "(1) the importance of the populations associated with a site to the ESU [or DPS] conservation, and (2) the contribution of that site to the conservation of the population through demonstrated or potential productivity of the area" (NOAA Fisheries 2005).

**Table 1** Primary constituent elements (PCEs) of critical habitats designated for ESA-listed steelhead species considered in the opinion

| Primary Constituent Elements Site Type | Primary Constituent Elements Site Attribute | Species Life History Event |
|---|---|---|
| Freshwater spawning | Substrate<br>Water quality<br>Water quantity | Adult spawning<br>Embryo incubation<br>Alevin growth and development |
| Freshwater rearing | Floodplain connectivity<br>Forage<br>Natural cover<br>Water quality<br>Water quantity | Fry emergence from gravel<br>Fry/parr/smolt growth and development |
| Freshwater migration | Free of artificial obstruction<br>Natural cover<br>Water quality<br>Water quantity | Adult sexual maturation<br>Adult upstream migration and holding<br>Kelt (steelhead) seaward migration<br>Fry/parr/smolt growth, development, and seaward migration |
| Estuarine areas | Forage<br>Free of artificial obstruction<br>Natural cover<br>Salinity<br>Water quality<br>Water quantity | Adult sexual maturation and "reverse smoltification"<br>Adult upstream migration and holding<br>Kelt (steelhead) seaward migration<br>Fry/parr/smolt growth, development, and seaward migration |
| Nearshore marine areas | Forage<br>Free of artificial obstruction<br>Natural cover<br>Water quantity<br>Water quality | Adult growth and sexual maturation<br>Adult spawning migration<br>Nearshore juvenile rearing |

*CHART Salmon and Steelhead Critical Habitat Assessments*

The CHART for each recovery domain assessed biological information pertaining to occupied by listed salmon and steelhead, determine whether those areas contained PCEs essential for the conservation of those species and whether unoccupied areas existed within the historical range of the listed salmon and steelhead that are also essential for conservation. The CHARTs assigned a 0 to 3 point score for the PCEs in each $HUC_5$ watershed for:

Factor 1. Quantity,
Factor 2. Quality – Current Condition,
Factor 3. Quality – Potential Condition,
Factor 4. Support of Rarity Importance,
Factor 5. Support of Abundant Populations, and
Factor 6. Support of Spawning/Rearing.

Thus, the quality of habitat in a given watershed was characterized by the scores for Factor 2 (quality – current condition), which considers the existing condition of the quality of PCEs in the $HUC_5$ watershed; and Factor 3 (quality – potential condition), which considers the likelihood of achieving PCE potential in the $HUC_5$ watershed, either naturally or through active conservation/restoration, given known limiting factors, likely biophysical responses, and feasibility.

### 2.3. 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).

This project would occur on Mason Lake in a nearshore cove, referred to as "Paradise Shore Marina Cove". Mason Lake covers 965 acres and has a maximum depth of 90 feet (WDFW 2023). The lake is circumvented by roads and residential development lines the lakeshore entirely with hundreds of houses and docks. A miniscule portion of shoreline is relatively undeveloped on the south side of the lake in association with the Mason Lake Recreational Area and on the north side at the outlet of the lake in associated with Mason Lake County Park. Sherwood creek connects Mason Lake to the Puget Sound at Allyn, WA. There are no documented significant barriers to anadromous fish. Upstream of Mason Lake, flowing into it, is Schumacher Creek. Sherwood Creek, Mason Lake, a small reach of Schumacher Creek and a portion Dry Creek, a tributary to Schumacher, are all listed as critical habitat for PS Steelhead. WDFW area habitat biologist, Kris Northcut, agreed that there is potential for salmon in Mason Lake, including steelhead and the lake's priority species for management by WDFW are Coho, and summer chum (Pers. Comm. Aug 31, 2022).

Paradise Shore Marina Cove is on the south east side of Mason Lake. It is about 230 x 230 feet of wetted surface and is connected to the main body of Mason Lake via a ~36-foot wide inlet on the north west corner of the cove. The cove was likely a historic backwater/floodplain area of the lake that was excavated to create a marina. The cove is fairly shallow (less than 10ft), but deep enough for small recreational boats to maneuver in and out. In the summer, the cove can contain dense aquatic vegetation. Substrate within the cove is a combination of gravel, sand, and silt. Surrounding the marina cove is mostly park-like conditions with grassed lawn and, on the south side, a paved parking lot, tennis court, and playground.

Mason Lake water quality listings, documented by the Washington Department of Ecology, include one Category 5 303d listing for methyl mercury in the tissues of fish within the lake. Samples of fish tissue taken between 2006 and 2017 displayed between 0.13 and 0.45 mg/kg of methyl mercury – with a criterion threshold for listing at 0.03 mg/kg. (Ecology Water Quality Atlas, accessed July 2023).

Listed Species' Presence

Mason Lake has documented presence of steelhead according to WDFW SalmonScape. PS steelhead in Mason Lake are likely to be winter run fish, from the Central and South Puget Sound Multiple Population Group (MPG). Overall Central and South Puget Sound MPG of steelhead has exhibited a strongly positive increase in five-year abundance. However, the NMFS species recovery plan for steelhead (NMFS 2019) calls for a 20,000 fish run and currently populations are at less than 10% of their recovery goal.

## 2.4. 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 (see 50 CFR 402.02). 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 the factors set forth in 50 CFR 402.17(a) and (b).

The construction activities will cause short term effects (turbidity, noise), the structures and planting plan will have long term effects (shade, reduced prey availability, reduced shallow water habitat, re-established riparian cover). The use of the marina will have long term effects throughout the lake (noise, water quality reductions). We present the effects by type.

### 2.4.1 Effects on Critical Habitat

The action area contains critical habitat for PS steelhead. The temporary and long-term effects of the proposed action, can modify the physical or biological features (primary constituent elements) of designated critical habitat. We evaluate here if those modifications alter the conservation role that the designated area is intended to support.

The physical and biological features / primary constituent elements (PCEs) of PS steelhead critical are listed in their entirety in Table 1 above in the status of the species and critical habitat section. NMFS determined that the following Freshwater Rearing and Freshwater Migration PCEs will be affected:
**Freshwater Rearing** PCEs are water quality, natural cover, forage, and floodplain connectivity.
**Freshwater Migration** PCEs are water quality, natural cover, and free passage (free of artificial obstruction).

Water Quality Reductions

*Suspended Sediment / Turbidity*
Short term increased turbidity are expected to occur during in-water removal and installation of marina structures - up to 60 days total. Because a silt curtain would be placed at the cove's entrance, we expect construction related turbidity to remain inside the marina cove area.
Over the life of the structures, intermittent episodes of suspended sediment would also occur, associated with propeller wash/vessel use, in the cove as well as throughout Mason Lake. Similar to construction-caused turbidity, these episodes are localized and brief, occurring when boats

motors are operating in shallow water. Both the construction and the vessels use episodes of turbidity create small/brief degradation of water quality but overall the conservation role of the water quality is retained at its current level.

*Reduced Dissolved Oxygen (DO)*
Short term and long term intermittent suspended sediments, as discussed above, can result in the suspension of anoxic sediment compounds that reduce DO in the water column in certain circumstances. Based on a review of six studies on the effects of suspended sediment on DO levels, LaSalle (1988) concluded that, when relatively low levels of suspended material are generated and counterbalancing factors such as flushing exist, anticipated DO depletion around in water work activities will be minimal. While high levels of turbidity could have a corresponding reduction in dissolved oxygen within the same affected area such turbidity levels are typically associated with dredging and placement of dredged or fill material.

During construction reduced DO is not expected to exceed the established mixing zone of within the cove.

*Noise in Aquatic Habitat*
Excessive sound can diminish the quality and usability of habitat. Underwater sound during vibratory pile driving of 10, 10" diameter galvanized steel piles (or stainless steel, or untreated wood) and the vibratory removal of 17 existing piles of various diameters could generate sound levels up to 161 dBrms (peak) at 10 meters (Caltrans 2020). The behavioral threshold for fish for all sound sources is 150 (Erbe and McPherson 2017). While underwater sound would largely be constrained to the cove itself, sound could extend via the marina entrance to the Mason Lake, affecting a narrow band (36 ft wide) all the way across Mason Lake (0.5 miles). This effect is likely to up to 2 hours per day for 5 days for a maximum of 10 hours.

Boat motors also create sound that can be detected in aquatic habitat. Similar to turbid conditions caused by propeller wash, motor noise is intermittent, episodic, but anticipated to occur for the life of the structures. Unlike turbidity, noise is not confined but spreads throughout the marina and into Mason Lake when boats are outside the marina.

Noise from each source sends vibration through the water in a manner that can make prey and predators both more difficult to detect by juvenile steelhead, or result in fish avoiding the location where noise occurs, temporarily reducing its function for rearing or migration.

<u>Natural Cover</u>

The replacement of over and in-water structures prevent the establishment of natural cover for juvenile PS Steelhead. Replacement of the floats with 50% grated decking and 69% open space will increase light penetration over the current conditions but some shading due to the floats and associated boats will still persist. The long-term presence of marina structures would suppress re-establishment of natural cover in the form of aquatic vegetation. Overwater and in-water structures would suppress the development of submerged and emergent aquatic vegetation. In addition to reduced SAV biomass and shoot density, shading also has been shown to be correlated with reduced density of the epibenthic forage under OWS's (Haas et al. 2002, Cordell et al. 2017). While the reduction in light and SAV could likely a cause for the reduction in epibenthos, changes in grain size due to boat action and current alteration also may contribute (Haas et al. 2002). Floats can provide habitat for piscivorous predators of salmonids, such as non-native bass. Overwater and in-water structures would suppress the development of submerged and emergent aquatic vegetation. by creating enduringly shaded areas. (Kelty and Bliven 2003) and by directly eliminating the natural lake-bottom substrate. Decreased ambient light typically results in lower overall productivity, which is ultimately reflected in lower shoot density and biomass (Shafer 1999; 2002). Ongoing vessel use will also reduce cover by continually disturbing sediment that would otherwise grow vegetation.

However, riparian plantings on the east side of the cove and the removal of a 70 linear foot bulkhead with regrading would contemporaneously result in a long-term increase in natural cover and decrease water temperatures where dappled shade from trees, and vegetation overhang the water. Such riparian vegetation can also be a source of detrital inputs of prey insects (addressed below) When the project elements are considered together, the changes to cover for rearing and migration values remain overall at their current level.

Forage

Long term presence of in and over water structures would limit forage species production including benthic and pelagic invertebrates via a direct reduction in substrate and a reduction in submerged and emergent vegetation at the site which provides food and habitat for forage species as well.

Riparian plantings on the east side of the cove would contribute a long-term increase in forage as prey items fall from the vegetation into the water.

Long-term intermittent disturbance caused by vessel use would also continue to negatively impact forage through agitation of benthic habitat and suppression of aquatic vegetation due to propeller use.

Temporary site disturbance of substrate would result in a proportional loss of forage production at the areas of disturbance. Turbidity (discussed above) may further diminish prey available with the action area.

We anticipate that despite the riparian plantings and the reduction in the number of slips, that prey communities will remain somewhat depressed. However, the presence/abundance of prey will continue to support rearing and migrating steelhead growth and development.

Unobstructed Passage

The replacement marina structures are may act as long-term barriers to juvenile migration, if juvenile steelhead enter the cove and encounter these structures. NMFS does not expect significant numbers of steelhead will enter the marina, but those that do could have greater bioenergetic expense or be at greater risk of predation (described more fully in effects to species, below) indicating degraded values for rearing and migration.

### 2.4.2 Effects on Listed Species

Effects on species are a function of exposure and response. The degree of exposure (duration and intensity) will influence response, as will the specific species, life stage, and underlying health of the individuals exposed.

Individuals PS steelhead will be exposed to the temporary and long term habitat effects discussed above. The structures at Paradise Shore Estates Marina would be expected to remain in the aquatic environment for their useful life (expected to be 40 years for the purpose of this analysis). Thus, multiple individuals from successive cohorts from the South Central Puget Sound MPG of PS steelhead are likely to be exposed to the permanent effects associated with the structures and site use.

Steelhead Presence by Lifestage During the Work Window

As described in the proposed action, all in-water construction would occur between July 1 and September 30, 2023 and possibly in 2024. If construction occurs in subsequent years of the Corps' permit, the standard work window of July 1 to August 15 applies.

Adult PS winter steelhead generally migrate into freshwater habitats from November through April (Light et al. 1989). Adults presence does not overlap with the proposed construction window. Adult steelhead may be affected by long-term effects of the proposed action but in very low numbers.

Juvenile steelhead are typically associated with fast-water stream and river habitats. NMFS expects that the majority of immature steelhead to migrate through the lake from upstream Schumacher Creek with minimal association with the nearshore. Typically, smolts are out-migrating to the ocean from spring to early summer of their first year (Light et al. 1989). Out-migrating smolts are also not likely to be in the action area during construction. However, due to the plasticity of life history strategies within *Oncorhynchus mykiss*, juvenile steelhead could utilize Mason Lake as an extended rearing life strategy, rather than simply migrating through.

There is a small chance that juvenile steelhead will be in the action area during construction.

Based on the proposed action at Paradise Shore Estates Marina (described above), the exposure of juvenile PS steelhead to temporary and long-term effects are presented below.

Water Quality

*Suspended Sediment / Turbidity*
Short term increased turbidity during construction could affect steelhead in the action area and long term intermittent suspended sediment associated with vessel use is likely to affect some steelhead for the design life of the structures are expected to occur during in-water removal and installation of marina structures.

While response to suspended sediment on fish increase in severity with sediment concentration and exposure time and can progressively include behavioral avoidance and/or disorientation, physiological stress (e.g., coughing), gill abrasion, and death—at extremely high concentrations (Newcombe and Jensen (1996)  studies show that salmonids have an ability to detect and distinguish turbidity and other water quality gradients (Quinn 2005; Simenstad 1988), and that larger juvenile salmonids are more tolerant to suspended sediment than smaller juveniles (Servizi and Martens 1991; Newcombe and Jensen 1996).

Juvenile PS steelhead are not notably nearshore dependent and so are not expected to be in shallow water, i.e. the cove, in large numbers. Those present near the cove entrance or are near vessels that originate from the marina would likely briefly be in the area where elevated suspended sediment would occur are expected respond by avoiding areas of high turbidity. Avoidance behavior can increase energy expenditure, concentrate fish presence in alternate areas where competition increases, or expose those juveniles to areas where predation risk is greater. There is a very small chance that steelhead juveniles could be trapped in the cove with high turbidity during construction when the silt curtain is erected, which would likely cause injury or death.

*Noise*

Vibratory pile driving in the action area could generate sound levels up to 161 dBrms (peak) at 10 meters (Caltrans 2020). While underwater sound would be most impactful in the cove itself, it would also potentially travel out via the cove entrance and affect critical habitat in a narrow band (36 ft wide) all the way across Mason Lake (0.5 miles).

Vibratory pile driving can generate noise levels that fish detect and respond to, including above the 150 dB behavioral threshold but well below the thresholds for physical injury which is considered to be 183 dB (Erbe and McPherson 2017). Steelhead may exhibit behavioral responses to vibratory driving. Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996). These changes make individuals less likely to feed, exhibit normal behavior, and more likely to be predated upon during pile driving.

Noise from boat motors can trigger startle response, raised cortisol, increased respiration, and avoidance behaviors, that again briefly impair both feeding behavior and predator avoidance (van der Knaap et al. 2022; McCormick et al. 2019). This effect will occur among many individuals over the lifetime of the structures, but because fish presence in this cove is already low, we cannot predict that these numbers would affect enough fish modify population characteristics.

Natural Cover

When juvenile steelhead encounter areas without cover, it can result in harm caused by changes to predator prey dynamics for steelhead associated with the action are because the action decreases habitat for forage species, decreases suitable cover for steelhead, and increasing habitat for predators. Steelhead may even be attracted to the OWS due to cooler water in the shade, then be eaten by a fish or bird predator. This may occur currently at the Hood Canal Bridge. Moore et al. (2013) concluded in their study that the Hood Canal Bridge may attract PS steelhead smolts to its shade. Additionally, floats and piers provide habitat for piscivorous predators of salmonids, such as non-native bass.

Riparian plantings on the east side of the marina will reestablish some natural cover for PS steelhead that enter the cove. Robust and mature riparian areas can increase fitness by providing steelhead with food from insects, and decreased metabolic rate via reduced water temperature. Once mature, the riparian plantings will decrease the likelihood of predation because the dappled shade from trees and vegetation overhanging the water provides effective cover/protection.

Forage

Reduce forage means a reduction in food items. Reduced forage would occur both during construction and also due to the persistent structures and boats on site that will cause shade, substrate scour, and reduced aquatic vegetation. This will reduce natural invertebrate production and represents a reduced fitness to steelhead due to a long term decrease in food items.

Areas where sediment is temporarily disturbed by pile driving, pile removal, abutment, and boat ramp construction will temporarily have diminished benthic prey communities.

Areas with repeated disturbance such as around the cove, the entrance, and popular shallow boating locations will experience long term episodic disturbance. Benthic prey communities in these areas will be disrupted be frequent churning water and sediment, suppressing this forage source (Eriksson et al. 2004). Aquatic vegetation that supports aquatic invertebrates will not be able to grow in these areas with persistent impacts. In areas where suspended sediment settles on the bottom, some smothering can occur which also disrupts the benthic communities. Areas where sediment is routinely disturbed by prop wash will experience repeated disruption of benthic prey communities, suppressing this forage source.

The speed of recovery by benthic communities following construction is affected by several factors, including the intensity of the disturbance, with greater disturbance increasing the time to recovery (Dernie et al. 2003). Additionally, the ability of a disturbed site to recolonize is affected by whether or not adjacent benthic communities are nearby that can re-seed the affected area. Thus, recovery can range from several weeks to many months.

Riparian plantings on the east side of the cove would contribute a long-term increase in forage as prey items fall from the vegetation into the water. A larger number of prey items (forage) from this area would increase overall fitness of steelhead. When exposed to reduced prey in one location and increased prey at another location, as occurs with this project, NMFS expects competition among juveniles where forage is available could result in higher energetic costs, which can reduce growth and fitness among a subset of juveniles (Matte et al. 2021).

Free Passage

Migrating or rearing juvenile steelhead could enter the cove and encounter the proposed structures. Juveniles will avoid the stark shadow of the structures (even with the grating) and travel around it. This may complicate steelhead ability to navigate and exit the cove and increase vulnerability to predations (Nightingale and Simenstad 2001b). Increased migration time can lead to increased predation and decreased fitness when reaching marine waters. If some life strategy of steelhead favors extended use of Mason Lake, then these structures would likely not impede migration, but would impede free passage in and out of the cove, a part of critical habitat.

Floodplain Connectivity

The continued use of this area as a marina facility is a long-term continuation of floodplain habitat alteration/elimination which affects individual fitness. Floodplains provide food sources, refuge from predators, and thermal refugia for salmonids. Mason lake has little to no floodplains or interconnected wetlands or backwaters due, primarily, to development.

Fishing

NMFS considers recreational fishing a likely occurrence in Mason Lake as it is open for fishing year-round (WDFW webpage[2] accessed 8/18/2023). It is likely that over time some unknown number steelhead will be injured, or caught and killed during fishing, because rainbow trout are genetically identical to steelhead, and it cannot be predicted which individuals would express anadromy versus a freshwater life history expression. We note here that trout fishing is not ESA-restricted.

## 2.5. Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 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.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area, such as recreational boating. 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 (Section 2.4).

Mason Lake is used for recreation and the adjacent uplands, for housing. Due to overall population growth rates in the Puget Sound, increased use of the lake via development and recreation outside of that considered in the effects analyses above is likely to occur. This could

[2] https://wdfw.wa.gov/fishing/locations/lowland-lakes/mason-lake#:~:text=Mason%20Lake%20is%20one%20of,bullhead%20catfish%20are%20also%20available.

exacerbate the effects associated with species and habitat impacts considered. Additional effects to PS steelhead associated with recreational activities include, additional riparian degradation, additional shoreline armoring, increased noise, turbidity, and physical disturbance caused by boating, fishing, etc. Recreational activities have the potential to cause additional cumulative effects when combined with the proposed action, including the construction-related disturbances and the increased boat activity that may follow.

## 2.6. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species and critical habitat. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

### 2.6.1 ESA Listed Species

The status of PS steelhead considered in this opinion is threatened. The status of steelhead is based in low abundance relative to historic numbers, with reduced productivity, spatial structure, and diversity. This depressed condition is a function of many factors, including reductions in the amount or quality of habitat throughout their range, and overharvest in previous years. Baseline conditions in the action area which were described earlier in this document reflect habitat degradation typical in lowland lake habitats. Total abundance for the total Central and South Puget Sound MPG is in the low thousands of fish (Ford 2022) and no data exists estimating the number of steelhead in the South Puget Sound Tributaries DIP. We know that the major contributors to the South and Central Puget Sound MPG are the Nisqually and the Puyallup, both having runs of about 1,000 adults each. Thus, an extremely small number of steelhead are surviving in this DIP compared to other larger systems in the South PS. In order to meet the recovery criterion for the Central and South Puget Sound MPS, four of the eight DIPs must be viable to support delisting. Currently, none of them are viable (NMFS 2019).

To this status and baseline we add the effects of the proposed action. NMFS identified several impacts each of which with the potential to reduce fitness and survival of juvenile steelhead.

Despite the anticipated adverse exposure and response among listed steelhead, even when considered over time, the numbers of individuals that would be affected over time would be low due to the project's location on the margin of Mason Lake. The likelihood of survival or recovery of the South Puget Sound Tributary DIP of steelhead considered in this opinion would not be appreciably reduced.

### 2.6.2 Critical Habitat

Critical habitat for Puget Sound steelhead includes 2,031 stream miles. Nearshore and offshore marine waters were not designated for this species. Mason Lake is part of that critical habitat.

Steelhead may not reside within the lake extensively throughout the year, but it is a key migratory pathway for adults and juveniles and alternate life histories of steelhead/rainbow trout could take place within this system that utilize the lake more extensively, especially since it is relatively deep and could provide thermal refugia to individuals.

The value of critical habitat through the PCEs identified above will continue to be diminished by the proposed marina structures and their associated use. Short term habitat impacts during construction will occur when migrating fish are not likely to occur within the lake, but ongoing habitat effects that diminish the value of critical habitat, including increased turbidity, decreased aquatic vegetation, alteration of floodplains, and direct elimination of usable critical habitat, will continue for an estimated 40 years resulting from the proposed replacements.

One of the ecological concerns identified within the ESA Recovery Plan for Puget Sound steelhead (NMFS 2019) is riparian conditions – "the degradation of habitat adjacent to streams rivers, lakes and nearshore areas. Impairment of near-bank areas to support plants, including large trees that stabilize banks, provide shade, and large woody debris." By removing a bulkhead and planting native vegetation on an area of the bank, this proposed action would continue to improve riparian conditions of Mason Lake, provided species survive to maturity, particularly the trees.

Critical habitat value within Mason Lake area will be continued at its current degraded state through the replacement of structures. Habitat value associated a reduced number of moorings, removal of a bulkhead, and riparian plantings will improve some aspects of critical habitat. We therefore conclude that the conservation role of critical habitat for PS steelhead will be retained after the temporary effects of construction have abated. The existing critical habitat for steelhead not further diminished by the proposed action, and continue to support the conservation roles for which they were designated.

## 2.7. Conclusion

After reviewing and analyzing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of PS steelhead.

## 2.8. Incidental Take Statement

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

### 2.8.1 Amount or Extent of Take

When take is in the form of harm from habitat degradation, it is often impossible to enumerate the take that would occur because the number of fish and marine mammals likely to be exposed to harmful habitat conditions is highly variable over time, influenced by environmental conditions that do not have a reliably predictable pattern, and the individuals exposed may not all respond in the same manner or degree. Where NMFS cannot quantify take in terms of numbers of affected individuals, we instead consider the likely extent of changes in habitat quantity and quality to indicate the extent of take as surrogates. The best available indicators for the extent of take, proposed actions are as follows.

NMFS has determined that incidental take is reasonably certain to occur in Table 2 below:

**Table 2**. Incidental take pathways and associated indicators in the amount or extent thereof.

| Incidental Take Pathway | Amount or Extent of Incidental Take |
|---|---|
| Harm, injury, or death caused by increased turbidity and decreased DO during **in-water construction.** | The area in Paradise Shore Cove (230x230 sqft) and up to 15% the width of Mason Lake (792 ft) from the cove for up to 60 days not exceeding 5 NTUs above background turbidity during the identified IWWW: Aug 15- Sept 30 over a maximum of two years. |
| Behavioral changes that could result in harm, injury, or death during vibratory **pile driving and pile removal**. | The area in Paradise Shore Cove (230x230 sqft) and across Mason Lake (0.5 miles) in a 36 ft wide band. Occurring over 5 total days and a maximum of 10 hours. |
| Harm caused by **persistence of over and in-water structures and associated vessel use.** | 40 years of: 3,123 square feet of floats and ramps for the marina, 61 total moorage slips, 10 piles, 216 sqft of concrete abutments, 901 sqft of boat ramp, 483 sqft ADA ramp, and 60 sqft concreted landing. |
| Harm, injury, or death caused by **fishing** (not targeting steelhead). | 61 moorage slips and 1 private boat ramp, available for use by HOA residents. |

### 2.8.2 Effect of the Take

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

### 2.8.3 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 incidental take associated with construction.
2. Minimize take from reduced prey and cover

### 2.8.4 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 Corps 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 (Minimize incidental take associated with construction):

    a. Prior to start of work, including deployment of any turbidity curtain, make visual observation for juvenile fish, and if noted make efforts to exclude them from the cove, via herding, net and release, or "soft start" pile driving (engage the driver briefly, then shut down for 10 minutes before restarting).
    b. Conduct turbidity monitoring on site and ensure that:
        i. Turbidity plume into Mason Lake does not occur.
        If turbidity is detected in the lake (outside the silt curtain) Halt construction, determine if additional measures can be put in place to constrain turbidity; wait for turbidity to subside before resuming work (with the additional measures if possible).

2. The following terms and conditions implement reasonable and prudent measure 2: Ensure the long-term success and habitat functionality of the proposed riparian plantings.

    a. Replant vegetation that fails and maintain a minimum 85percent plant survival at 5 years from construction.
        i. Replacements do not need to be the same species but must be a similar vegetative type (ex. shrub with shrub or shrub(s) with similar cover).
    b. Remove invasive species from the riparian area for the first 5 years to assist in native species' establishment.

3. The following terms and conditions implement reasonable and prudent measure 1 and 2: Ensure completion of a monitoring and reporting program for incidental take pathways.

    a. The applicant shall provide to projectreports.wcr@noaa.gov a post construction report that includes

i. As-built documentation and site photos following construction to confirm constructed elements do not exceed those analyzed.
ii. The number of individuals removed from cove during construction for salvage purposes, and any fish observed to be injured or killed during handling or by construction activities. Indicate species, if possible.
iii. Please include in the regarding line this project's NMFS reference number: WCRO-2022-01084

## 2.9. Conservation Recommendations

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

1. Install pervious pavement or "Enhanced level" treatment for stormwater (per Ecology) when the parking lot is resurfaced.
2. Expand riparian plantings to include cottonwood trees around the south and west sides of the cove. Increase overall number of large trees planted, to provide natural shade and decrease water temperature, and plant all or some of the Paradise Cove "spit", leaving a gravel or wooden pedestrian access trail to the swimming area.
3. Remove the U-shaped float system around the swimming area and replace it with a ring of anchored buoys.
4. Do not dredge or cut aquatic vegetation from the cove or swimming area unless absolutely necessary for boat access. If aquatic vegetation removal is necessary for vessel access, do so with a cutting device, not scooping, that does not disturb bottom sediments.

## 2.10. "Not Likely to Adversely Affect" Determinations

<u>Puget Sound Chinook and Hood Canal Summer Run Chum</u>

PS Chinook – Chinook associated with this area are part of the Central/South Sound MPG. The two significant populations in this MPG are from the Nisqually River and the Puyallup River. The first half mile of Sherwood creek (connecting Mason lake to the Puget Sound) has documented presence of fall Chinook, but the species has not been documented upstream (WDFW SalmonScape). According to the submitted biological assessment, these were stray adult hatchery Chinook, but no citation was provided and the consulting biologist was unable to confirm this information. However, there are no barriers preventing Chinook from accessing Mason lake via Sherwood Creek. Therefore, PS Chinook have a low, albeit insignificant, chance of being affected by the proposed action. See the PS Chinook NLAA species analysis below the Terms and Conditions section of this opinion.

*Critical Habitat*
Critical habitat for PS Chinook and for HCSR chum is not expected to be affected by this project because it does not exist in Mason lake and the nearest critical habitat for these species is in the Puget Sound. Because critical habitat is many miles downstream of the project site and action area on Mason Lake, we expect exposure of PS Chinook salmon and HCSR chum critical habitat to effects from the proposed action is discountable.

*Species*
There are no passage barriers identified on Sherwood Creek between the Puget Sound at Allyn and Mason Lake that would prevent Chinook or HCSR chum from migrating upstream. However, these species are not known to extend their distribution upstream from Sherwood Creek into Mason Lake (none have been documented in the lake) and HCSR chum do not occur in the South-Central Puget Sound (where the outlet of Sherwood Creek exists). We expect exposure of these species to any effects of the proposed action is discountable.

### 2.11. Reinitiation of Consultation

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If 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 the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

## 3. MAGNUSON–STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

This analysis is based, in part, on the EFH assessment conducted by the consulting biologist and descriptions of EFH for Pacific Coast groundfish (Pacific Fishery Management Council (PFMC 2005), coastal pelagic species (CPS) (PFMC 1998), Pacific Coast salmon (PFMC 2014); and highly migratory species (HMS) (PFMC 2007) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

### 3.1. Essential Fish Habitat Affected by the Project

The aquatic environment in which the proposed action would take place is Essential Fish Habitat (EFH) for Coastal Pacific Salmon (pink, Chinook, and Coho salmon).
The proposed action and action area for this consultation are described in Section 1 (ESA consultation) of this document.

The action area, including the area directly impacted by the replacement structures and the action area affected by temporary construction effects as well as ongoing effects associated with the use of vessels at the marina will adversely affect Coastal Pacific Salmon. The PFMC described and identified EFH for Pacific coast groundfish Pacific salmon (PFMC 2014) as well as published a Pacific Coast Salmon Fishery Management Plan (FMP) with updated goals and management of commercial and recreational salmon fishing (PFMC 2022).

Habitat Areas of Particular Concern (HAPCs) the would be affected for salmon associated with the action area (all of Mason Lake) are **thermal refugia and submerged aquatic vegetation.** See section 2.3 above in the ESA consultation for detailed information regarding the habitat currently present. See the baseline section in the ESA portion above for an overview of the habitat currently present at and around the Paradise Shoreline Estates Marine Cove.

EFH species presence

Coho salmon are likely to occur in Mason Lake according to "1997 Mason Lake survey: the warmwater fish community of a lake dominated by non-game fish" (Mueller 1997).
Compared to steelhead discussed in the Biological Opinion above, juvenile Coho are much more likely to be found rearing in backwater areas such as those associated with the marina cove. Coho will rear in slack water and floodplain habitats in freshwater before out-migrating.

### 3.2. Adverse Effects on Essential Fish Habitat

The project includes both detrimental and beneficial effects on EFH for Pacific Salmon. The increase in riparian vegetation on site and removal of 70 linear feet of a bulkhead will improve on-site conditions including temperature, cover, and forage for salmonids. Detrimental effects of the proposed action on habitat are also detailed in Section 2 of this document (ESA effects analysis). Specific features of EFH that will be adversely affected include water quality, prey, and aquatic vegetation affected by construction impacts, ongoing intermittent impacts from

operation of boats that affect water quality and aquatic vegetation, and displacement of habitat via the boat ramp and marina structures.
These effects mostly will be long-lasting associated with the design life of the proposed structures and, will primarily occur within and just outside the marina cove, could extend all throughout Mason Lake.

Effects to HAPCs

Salmon HAPCs in the action area:
Thermal refugia: Mason lake could act as a thermal refugia for salmonids because of the depth (Max 90 ft) and thermocline associated with this depth. While adult salmon could utilize this habitat, it is unlikely that juveniles would. Naturally shaded areas along the shoreline would provide thermal refugia as Coho, in particular, out-migrate to the Puget sound and more so if they rear within the lake itself. Mason lake is highly developed and so small areas with a more natural shoreline and shading from the riparian may have disproportionate importance to juvenile coho.

This project would both benefit and diminish the long-term value of the thermal refugia HAPC. The riparian plantings proposed would increase shading in the cove and lower water temperature. The ongoing use of the cove as a marina would eliminate the ability of the area to develop a more robust riparian for the design life of the structures (unless additional project/site changes take place). Vessel use associated with the marina may raise temperatures by mixing water and by creating bank splash from wakes, thereby preventing the development of bank-side riparian cover where propellers are used.

Submerged aquatic vegetation: As noted above in the Mueller report, an array of aquatic vegetation diversity is present in Mason Lake. The replacement of structures at the marina and regular use of the cove by vessels would prevent dense vegetation from establishing in this backwater area and diminish its development episodically throughout the lake in shallow areas where vessels are used. This will in turn diminish cover and forge for salmonids, particularly juvenile coho.

The episodic, and enduring diminishments of habitat created by the structures and associated use thereof at this location would contribute to the degradation Coastal Salmonid EFH. These effects further constrain the carrying capacity for out-migrating and rearing juvenile salmonids and potentially in-migrating adults within the action area. Temporary effects from construction, while adverse, would not last for more than 60 days total when salmonids are unlikely to be migrating. Riparian improvements would chronically improve the potential thermal refugia on the east side of the cove, contributing a benefit to many future cohorts.

### 3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

1. Maintain the epoxy/polyurea coating on piles to prevent flaking/shedding of plastic into Mason Lake.
2. Rope off areas with native plantings for the first 2 years.
3. Use biodegradable materials for 5 above and for any plant "tubes", geotextile, etc. but if not available then ensure plastic material are removed after plants are well established.
4. Establish a "no wake" zone in the cove and for 100 feet waterward outside its entrance.
5. Include additional tall trees, such as cottonwoods, in the riparian planting plan to increase future shade over the water.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, for Coastal Salmonid EFH.

### 3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, The Army 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.

### 3.5. Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations [50 CFR 600.920(l)].

## 4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

## 4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps of Engineers. Other interested users could include Paradise Service Associates, and users of the marina. Individual copies of this opinion were provided to the Corps of Engineers and the applicant. The document is available at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

## 4.2 Integrity

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

## 4.3 Objectivity

***Information Product Category***: Natural Resource Plan

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

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

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

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

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