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-2019-00451

June 6, 2019

Michelle Walker
Chief Regulatory Branch
Seattle District, U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, Letter of Concurrence, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the University of Washington's Boat Street Project, Seattle, Washington. HUC: 171100120400 – Lake Union

Dear Ms. Walker:

Thank you for your email on January 25, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the University of Washington's Boat Street Project. In this opinion, we conclude that the proposed action is likely to adversely affect Puget Sound (PS) Chinook (*Oncorhynchus tshawytscha*) and is not likely to jeopardize their continued existence or result in the destruction or adverse modification of PS Chinook critical habitat. This document also serves to document our concurrence that the proposed action is not likely to adversely affect PS steelhead (*O. mykiss*).

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal action agency must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)) and concluded that the action would adversely affect the EFH of Pacific Coast salmon. Therefore, we have included the results of that review in Section 3 of this document.

Please contact Mike Lisitza of the Oregon/Washington Coastal Area Office at (360) 753-4407, or by email at mike.lisitza@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

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

cc: Kathryn Heard, U.S. Corps of Engineers
Juliana Houghton, U.S. Corps of Engineers
Alison O'Sullivan, Suquamish Tribe
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Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the

University of Washington's Boat Street Project
Seattle, Washington (HUC: 171100120400 – Lake Union)

NMFS Consultation Number: WCRO-2019-00451

Action Agency: U.S. 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	No	No	No	No
Puget Sound Chinook (*O. tshawytscha*)	Threatened	Yes	No	Yes	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: June 6, 2019

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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.) and implementing regulations at 50 CFR 402. We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file the Oregon Washington Coastal Office.

1.2. Consultation History

The U.S. Army Corps of Engineers (Corps) requested formal consultation on January 25, 2019. Consultation was initiated on that date.

1.3. Proposed Federal Action

“Action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). For EFH, 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 Corps proposes to authorize the University of Washington’s (UW) removal of an existing wharf and construction of a new pier in the City of Seattle, Washington. The new pier will replace the functions of the existing wharf. They will construct the new pier at an existing marina on the northern shore of Portage Bay. The new pier will be L-shaped with two legs: a 60-foot long by 4-foot wide leg and a 61-foot by 8-foot wide leg. The total over-water area of the pier will be 725 square feet. Eight six-inch steel piles will support the first leg, and eight eight-inch steel piles will support the second leg. The UW will use a vibratory hammer to drive the piles over the course of one to two days. The UW will also remove a 3,242 square feet solid-decked wharf and the 41 12- to 24-inch piles that support it. They will conduct all work from a construction barge between October 1, 2019 and April 15, 2020.

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 adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical 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 non-discretionary 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 steelhead. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (Section 2.11).

2.1. Analytical Approach

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

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified 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.

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

- Identify the range-wide status of the species and critical habitat expected to be adversely affected by the proposed action.

- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

2.2. Range-wide Status of the Species and Critical Habitat

This opinion examines the status of each species that would 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' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

2.2.1 Climate Change

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. The largest hydrologic responses are expected to occur in basins with significant snow accumulation, where warming decreases snow pack, increases winter flows, and advances the timing of spring melt (Mote 2016; Mote et al. 2014). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Mote et al. 2014; Tague et al. 2013).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4 degrees Fahrenheit as an annual average, and up to 2 degrees Fahrenheit in some seasons (based on average linear increase per decade; (Abatzoglou et al. 2014; Kunkel et al. 2013)). Recent temperatures in all but two years since 1998 ranked above the 20th century average (Mote et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10 degrees Fahrenheit, with the largest increases predicted to occur in the summer (Abatzoglou et al. 2014).

Decreases in summer precipitation of as much as 30 percent by the end of the century are consistently predicted across climate models (Abatzoglou et al. 2014). Precipitation is more likely to occur during October through March and less during summer months. More winter precipitation will be rain than snow (ISAB 2007) (Mote et al. 2013; Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al., 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al. 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al. 2014).

The combined effects of increasing air temperatures and decreasing spring through fall flows are expected to cause increasing stream temperatures; in 2015 this resulted in 3.5-5.3 degree Celcius increases in Columbia Basin streams and a peak temperature of 26 degrees Celcius in the Willamette (NWFSC 2015). Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009).

Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Isaak et al. 2012; Mantua and Hamlet 2010). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier et al. 2008; Tillmann and Siemann 2011; Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer et al. 1999; Raymondi et al. 2013; Winder and Schindler 2004). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Raymondi et al. 2013; Wainwright and Weitkamp 2013).

As more basins become rain-dominated and prone to more severe winter storms, higher winter stream flows may increase the risk that winter or spring floods in sensitive watersheds will damage spawning redds and wash away incubating eggs (Goode et al. 2013). Earlier peak stream flows will also alter migration timing for salmon smolts, and may flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and reducing smolt survival (Lawson et al. 2004; McMahon and Hartman 1989)

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7 degrees Celcius by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Reeder et al. 2013; Tillmann and Siemann 2011).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. A 38 percent to 109 percent increase in acidity is projected by the end of this century in all but the most stringent CO2 mitigation scenarios, and is essentially irreversible over a time scale of centuries (IPCC 2014). Regional factors appear to be amplifying acidification in Northwest ocean waters, which is occurring earlier and more acutely than in other regions and is already impacting important local marine species (Barton et al. 2012; Feely et al., 2012). Acidification also affects sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely et al. 2012; Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Reeder et al. 2013; Tillmann and Siemann 2011). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005; Zabel et al. 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Reeder et al. 2013; Tillmann and Siemann 2011).

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these ESUs (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic impacts on species and ecosystems (Doney et al. 2012). These conditions will possibly intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.2 Status of the Species

We listed the Puget Sound Chinook salmon ESU as threatened on June 28, 2005 (70 FR 37160). This ESU comprises 22 populations distributed over five geographic areas. Most populations within the ESU have declined in abundance over the past 7 to 10 years, with widespread negative trends in natural-origin spawner abundance, and hatchery-origin spawners present in high fractions in most populations outside of the Skagit watershed. Escapement levels for all populations remain well below the TRT planning ranges for recovery, and most populations are consistently below the spawner-recruit levels identified by the TRT as consistent with recovery (NWFSC 2015; Shared Strategy for Puget Sound 2007; NMFS 2006).

Limiting factors for this ESU include:

- Degraded floodplain and in-river channel structure
- Degraded estuarine conditions and loss of estuarine habitat
- Degraded riparian areas and loss of in-river large woody debris
- Excessive fine-grained sediment in spawning gravel
- Degraded water quality and temperature
- Degraded nearshore conditions
- Impaired passage for migrating fish
- Severely altered flow regime

More information can be found in recovery plans and status reviews for these species. These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

2.2.3 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).

For most salmon and steelhead, NMFS's critical habitat analytical review teams (CHARTs) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005). The conservation rankings were high, medium, or low. To determine the conservation value of each watershed to species viability, the CHARTs evaluated the quantity and quality of habitat features, the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area. Even if a location had poor habitat quality, it could be ranked with a high conservation value if it were essential due to factors such as limited availability, a unique contribution of the population it served, or is serving another important role.

We designated critical habitat for the Puget Sound Chinook salmon ESU on September 9, 2005 (70 FR 52630). Critical habitat for Puget Sound Chinook salmon includes 1,683 miles of streams, 41 square mile of lakes, and 2,182 miles of nearshore marine habitat in Puget Sounds. The Puget Sound Chinook salmon ESU has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value.

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this project includes the footprint of the project and adjacent areas of Portage Bay within 150 feet of in-water construction due to the physical extent of elevated suspended sediment. The action area is occupied by PS Chinook salmon and is critical habitat for PS Chinook salmon. The action area is EFH for coho salmon and Chinook salmon (PFMC 2014).

2.4. Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The 692-square-mile Lake Washington watershed is located in western Washington. It includes two major river systems, the Cedar and Sammamish rivers, and three major lakes, Lake Washington, Lake Sammamish, and Lake Union. The watershed drains to central Puget Sound through the City of Seattle. With a surface area of 34.6 square miles, Lake Washington is the largest lake in Washington State west of the Cascades. The lake is 18.6 miles long and 1.5 miles wide with an average depth of 108 feet and a maximum depth of 220 feet. The Lake Washington watershed is home to Chinook, coho, and sockeye salmon, steelhead, rainbow, cutthroat, and bull trout. We designated Lake Washington and the Cedar River watershed as critical habitat for PS Chinook salmon.

Historically, the Lake Washington watershed drained south into the Black and Duwamish rivers. In 1916, the Corps constructed the locks and excavated the Ship Canal, connecting the Union Bay area in Lake Washington with Salmon Bay in Puget Sound. These hydrologic changes lowered the lake level 9 feet, dried up lake shoreline wetlands, and disconnected Lake Washington from its historical outlet, the Black River. Salmon populations were forced to find a new route back to their natal streams. Since 1916, shoreline and watershed development has further altered habitat conditions in the Lake Washington system.

Since 1916, Lake Washington has lost much of its natural shoreline habitat. This alteration resulted both from hydrologic modifications and loss of riparian vegetation to installation of bank armoring, and construction of overwater structures (SPU 2008.). Shoreline vegetation in Lake Washington was previously dense trees, shrubs, and Tule grass. Now, vegetation is primarily landscaping associated with residential properties. A survey of 1991 aerial photographs of Lake Washington estimated that 4 percent of the shallow water habitat within 100 feet of the shore was covered by residential piers (excluding coverage by commercial structures and vessels) (USFWS 2008). Later studies report that about 2,700 docks are present in Lake Washington and approximately 80 percent of the shoreline is armored (Warner and Fresh 1999; City of Seattle 2000). These docks cover approximately 57 acres of the lake. The density of docks and shoreline modifications throughout the Ship Canal, Portage Bay, and Lake Union approaches 100 percent (City of Seattle 1999; Weitkamp and Ruggerone 2000).

Both recreational and commercial boats use the navigation channel through Portage Bay. The navigation channel is the only way to access Puget Sound for the thousands of boats moored at residential piers and private marinas in Lake Washington. For much of the year, boating activity is light. After the 4th of July holiday, boat traffic increases dramatically, then drops off again when cool weather returns in the fall.

The baseline conditions have affected PS Chinook salmon and PS Chinook salmon critical habitat. Lake Washington PS Chinook salmon are fall-run stocks. The adults first appear at the lock complex in mid-June. In general, peak returns occur in mid- to late-August and the adult run is completed by early October. Lake Washington PS Chinook salmon have declined since peak returns during the mid-1980s (Weitkamp and Ruggerone 2000). Two populations of the PS Chinook salmon ESU are present in the Lake Washington basin, the north Lake Washington Tributaries population and the Cedar River population. Most natural production of juvenile Chinook salmon in Lake Washington originates in the Cedar River. For the north Lake Washington Tributaries population, most natural production is from Bear Creek. The 5-year geometric mean of raw wild spawner counts between 2010 and 2014 was 160 for the north Lake Washington tributaries population and 881 for the Cedar River population. Small numbers of Chinook salmon also spawn in other tributaries to Lake Washington and Lake Sammamish, but no information is available for the production from these streams (Celedonia et al. 2008a). Hatchery production in the basin occurs at the Issaquah Creek State Hatchery. Chinook salmon from this hatchery are part of the ESU.

Most juvenile Lake Washington Chinook salmon migrate to the ocean in their first year. DeVries et al. (2005; 2007; 2008) documented juvenile outmigration through the Lake Washington Ship Canal (Ship Canal) from May to August with peak out-migration from late May to early June. Less than one percent of Chinook salmon spend a year or more in the lake prior to emigrating, however there are no data on their actual numbers or densities within Lake Washington or the Ship canal. (Devries et al. 2005). In Lake Washington, juvenile Chinook salmon use lentic habitat as a migratory corridor from late May through July and for rearing from January-June (Celedonia et al. 2008a). Chinook salmon juveniles either enter Lake Washington shortly after emergence (mid-January to March) and rear in the Lake for three to five months, or they rear in their natal tributaries and enter Lake Washington between April and late June (Celedonia et al. 2008a; Seiler et al. 2003).

Juvenile Chinook salmon from the Cedar River enter Lake Washington and rear in the south end of the Lake from January to May (Tabor and Piaskowski 2002; Tabor et al. 2006). During this time, they inhabit shallow areas (0.1 to 1.3 m deep) with a sandy substrate and gentle sloping gradient. Juvenile Chinook salmon will also rear in non-natal tributaries (Tabor et al. 2006). Over-water structures can provide cover for small juvenile Chinook salmon in February and March but, as they grow larger and predators such as smallmouth bass move inshore, Chinook salmon avoid structures. Fresh and Lucchetti (2000) found juvenile Chinook salmon in Lake Washington are primarily restricted to the littoral zone until mid-May when they are large enough to move offshore. From May to July, juvenile Chinook salmon are located throughout the Lake (Celedonia et al. 2008a).

Juvenile Chinook salmon from the Cedar River migrate north along the western shoreline of the lake during the day in shallow water three to eight feet deep. Migrating smolts do not avoid milfoil (Tabor and Piaskowski 2002; Tabor et al. 2006; Celedonia et al. 2008b), but rather the milfoil serves as a false-bottom which juvenile Chinook salmon migrate above. Celedonia et al.

(2008b; 2009) observed juvenile Chinook salmon in deeper water (up to 16 feet deep) in areas of dense milfoil. Migrating Chinook salmon smolts avoid over-water structures (Tabor and Piaskowski 2002; Tabor et al. 2006). They either move into deeper water to pass beneath the structure or move around the perimeter of the structure (Celedonia et al. 2008a).

The Lake Washington portion of the action area contains PBFs 2 (freshwater rearing) and 3 (freshwater migratory corridor) of PS Chinook salmon critical habitat. The re-routing of the Cedar River forced juvenile Chinook to use Lake Washington for rearing and migration. Juvenile Chinook are dependent on shallow nearshore habitat for predator avoidance. The shoreline modifications described above have substantially degraded the function of these PBFs. The action area is typical for Portage Bay. Most of the area between the shoreline and the navigation channel is covered with mooring facilities, and the shoreline is completely bulkheaded.

2.5. Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

2.5.1 Effects on Species

Over-water Cover

Prior to 2001, most evidence for over-water structure effects on juvenile salmon migration was observational (Simenstad et al. 1999). The two primary concerns with over-water structures for juvenile Chinook salmon are migration delays and increased vulnerability to predators. In 2001, the USFWS began a series of studies to characterize the movement and habitat use of juvenile Chinook salmon and two of their predators in Lake Washington and the Ship Canal (Celedonia et al. 2008a). These studies represent the best available data on the effects of over-water structures on salmonids in lakes Washington and Sammamish. These studies included acoustic tracking of tagged juvenile Chinook salmon. Between 2003 and 2008, the USFWS studied the movement and habitat use of juvenile Chinook salmon, smallmouth bass, and northern pike minnow in the Ship Canal and at the SR 520 bridge (the bridge) west approach (east of Foster Island) using acoustic tracking (Celedonia et al. 2008a; 2008b; 2009). Below are summaries of the findings of these studies. Celedonia et al. (2008a) reported findings from tracking studies performed in Lake Washington and the Ship Canal during May, June, and July of 2004 and 2005:

1. Juvenile Chinook salmon movement patterns varied within each site, from site to site, and from year to year. Each site was used differently by juvenile Chinook salmon, and the behavior of individual fish varied considerably.
2. Juvenile Chinook salmon showed two predominant migratory behaviors: active migration, where they swam rapidly toward Puget Sound; and holding, where they appeared paused in their migration.

3. At the one site studied in both years (Portage Bay), juvenile Chinook salmon movement patterns were different in the two sample years. In 2004, most fish spent several hours to several days at the site, whereas in 2005 most fish actively migrated spending less than one hour at the site. Differences in timing of moon apogee relative to tagged fish release appeared to be the primary contributing factor to these differences.
4. Distinct diel patterns were observed. In Lake Washington, juvenile Chinook salmon were close to shore in shallow water (1 to 5 m) during the day, and far offshore in limnetic areas at night.
5. Over-water structures and macrophyte beds appeared to influence movement patterns and depth selection. Actively migrating juvenile Chinook salmon appeared to change course as they approached and moved around structures. Fish appeared less hesitant to pass beneath narrow structures. Fish also sometimes moved into deeper water to travel beneath or around structures.
6. When macrophytes were present, juvenile Chinook salmon appeared to use deeper water, moving above the macrophyte canopy rather than avoiding macrophytes altogether. Macrophytes appear to function as a false bottom.
7. Smallmouth bass, a predator of juvenile salmonids, were generally close to shore in water that was less than four meters deep. Smallmouth bass were usually closely associated with over-water structure, steep sloping shoreline, and the offshore edge of aquatic macrophytes. Overlap in habitat between smallmouth bass and juvenile Chinook salmon occurs within each of these habitat types.
8. Prickly sculpin were primarily active at night, especially in shallow water. Nighttime patterns of prickly sculpin behavior may help explain the distribution of juvenile Chinook salmon (nighttime selection of offshore limnetic areas).

Celedonia et al. (2008b) reported findings from tracking studies performed in Lake Washington at the State Route (SR) 520 bridge during May to August of 2007:

1. Behaviors of juvenile Chinook salmon were similar within release groups, but varied considerably between release groups. June 1 smolts exhibited an active migration pattern, rapidly migrating through the study site. June 14 and 28 smolts exhibited holding behaviors at or near the study site. Differences in migration cues (moon apogee), physiological status, water temperature and clarity, and prey availability may have contributed to the observed differences in behavior between release groups.
2. There was no evidence that the bridge at any time presented a complete barrier to juvenile Chinook salmon migration. Common behaviors included: 1) fish passing beneath the bridge with no apparent delay; 2) fish passing beneath the bridge after delays of a few seconds up to 46 minutes; and 3) fish passing beneath the bridge on multiple occasions.
3. Among actively migrating juvenile Chinook salmon, slightly more than one-third were delayed 3 to 46 minutes (median 15 minutes). Slightly less than one-third were delayed for less than one minute, and one-third appeared completely unhindered by the presence of the bridge.
4. Behavior may have been influenced by water depth, height of the bridge above the water surface, location of the bridge shadow at time of encounter, degree of contrast at the

light-shadow edge, light intensity at time of crossing, and presence and variation in macrophyte density. Many of these factors varied together, and thus could not be isolated for their individual influence on behavior.

5. Holding juvenile Chinook salmon often crossed beneath the bridge to the north and were later observed returning to and holding in areas around the bridge. Holding smolts selected for areas near the bridge (5 to 20 meters from bridge edge), as well as areas of dense macrophytes away from the bridge. When near the bridge, smolts selected deeper water.
6. Holding behaviors may be triggered by an inhibition to enter the Montlake Cut arising from one or more ecological barriers, such as high water clarity, lack of directional flow, and/or elevated water temperatures. Inhibitions may also arise from a decrease in migration urge associated with desmoltification caused by prolonged exposure to elevated water temperatures.
7. Smallmouth bass previously captured in the Ship Canal were observed at the study site. Small bass overwhelmingly selected for nearshore over-water structures, and made no notable use of the bridge. Larger bass selected for both nearshore over-water structures and the bridge. Some bass were closely associated with bridge columns.

Celedonia et al. (2009) reported findings from tracking studies performed in Lake Washington at the SR 520 bridge during May to August of 2008:

1. Patterns in juvenile Chinook salmon behavior were similar to those observed in 2007, generally similar within release groups, but varied considerably between release groups. Three release groups primarily exhibited holding behaviors.
2. As in 2007, response to the bridge was at least partially dependent upon whether fish were actively migrating or holding. Behaviors of actively migrating fish were similar in both years, although few independent observations were obtained in 2008. Combining both years, 35 percent of actively migrating smolts showed minimal or no response to the bridge, 42 percent paralleled the bridge before passing underneath, and 23 percent paralleled the bridge and milled near the bridge before passing underneath. Median delay was 63 seconds (range 6 seconds to 19 minutes) for paralleling fish, and 22 minutes (range 3 to 46 minutes) for milling fish.
3. Holding juvenile Chinook salmon commonly selected for areas near the bridge (within 20 m) or condominium on the south side of the site. During the day, fish selected for deeper water when near the bridge or condominium than when they were not near either structure. Similar observations were made in 2007.
4. At night, juvenile Chinook salmon were attracted to areas where street lamps cast light into the water. A reevaluation of 2007 data found a similar pattern. Bridge lighting may be partially responsible for nighttime selection of the bridge area by juvenile Chinook salmon. However, neither smallmouth bass nor northern pikeminnow were attracted to the lights.
5. Results for northern pikeminnow and smallmouth bass were similar to 2007, and therefore data from both years were combined to provide more robust analyses. Northern

pikeminnow concentrated in moderately dense vegetation, with no strong affinity for the bridge. Smallmouth bass did show a strong affinity for over-water structures, including the bridge. Smallmouth bass were also often closely associated with bridge columns.

6. Juvenile salmonids made up 35 percent of the northern pikeminnow diet. Approximately half of the smallmouth bass diet was composed of juvenile salmonids.
7. The authors suggest, with regard to holding behaviors and daytime attraction to the bridge, that the proposed bridge should lessen attraction. Consequences could include shorter area residence times. The proposed new bridge would reduce the quality of habitat for smallmouth bass.

Suspended Sediment

Salmonids typically avoid areas of higher suspended sediment which can displace them from their preferred habitats. Fish unable to avoid suspended sediment can experience adverse effects. The severity of effect of suspended sediment increases as a function of the sediment concentration and exposure time, or dose (Newcombe and Jensen 1996; Bash et al. 2001). Suspended sediments can cause sublethal effects such as elevated blood sugars and cough rates (Servizi and Martens 1991), physiological stress, and reduced growth rates. Elevated turbidity levels can reduce the ability of salmonids to detect prey, cause gill damage (Sigler et al. 1984; Lloyd et al. 1987; Bash et al. 2001), and cause juvenile steelhead to leave rearing areas (Sigler et al. 1984). Additionally, short-term pulses of suspended sediment influence territorial, gill-flaring, and feeding behavior of salmon under laboratory conditions (Berg and Northcote 1985). Adult and larger juvenile salmonids appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, research indicates that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Lloyd et al. 1987; Servizi and Martens 1991).

Monitoring turbidity, a measurement of water clarity, is a surrogate for monitoring the concentration of suspended sediment in a water sample. A nephelometric turbidity unit (NTU) is a measurement of turbidity. For in-water project activities in the lakes, we expect turbidity levels will not exceed five nephelometric turbidity units (NTUs) over background at 150 feet from the in-water activity. This is the State water quality standard that projects must meet (WAC 173-201A-200).

Removing the 41 existing piles and installing the 16 new piles may increase suspended sediment. As part of a test pile project for the State Route (SR) 520 bridge project, WSDOT monitored turbidity during the installation and removal of hollow, round 30-inch steel piles in Lake Washington (Bloch 2010). Monitoring data demonstrated that elevated turbidity was typically constrained to within approximately 100 feet of the construction activity, with turbidity levels beyond that distance rarely exceeding 3 NTU above background, and not exceeding 3 NTU above background at 150 feet. Monitoring data also showed removing piles caused the greatest increases in turbidity. Underwater video of the pile removal shows sediment falling out of the hollow pile as it is removed. Pile installation did not create measureable increases in turbidity. We expect the increases in turbidity from this project to be equal to or less than those from the

520 test pile project. The piles removed for this project will be smaller in diameter (12 to 24 inches). These will generate less turbidity than the test piles both because of their smaller size.

All of the pile removal will take place between October 1, 2019 and April 15, 2020. This window avoids all life history stages of Chinook salmon. We do not expect Chinook salmon to be exposed to this stressor.

Boating

Graham and Cooke (2008) studied the effects of three boat noise disturbances (canoe paddling, trolling motor, and combustion engine) on the cardiac physiology of largemouth bass. They found that exposure to each of the treatments resulted in an increase in cardiac output in all fish, associated with a dramatic increase in heart rate and a slight decrease in stroke volume, with the most extreme response being to that of the combustion engine treatment. Recovery times were the least with canoe paddling (15 minutes) and the longest with the power engine (40 minutes). They postulate that this demonstrates that fish experienced sublethal physiological disturbances in response to the noise propagated from recreational boating activities.

As described in the baseline section, boating activity picks up after the July fourth holiday and continues in to the fall. This timing avoids the peak juvenile Chinook outmigration, but lands squarely on top of the adult Chinook salmon migration. We expect that the late-migrating juvenile Chinook and most adult Chinook will be exposed to boating and experience sublethal physiological stress.

As described in the baseline section, all boat traffic between Puget Sound and Lake Washington must pass through Portage Bay. NMFS cannot determine what proportion of the boating will be from boats moored at the new pier versus boats using the navigation channel. While the proportion cannot be quantified, the proposed action will, to some extent, help maintain the existing levels of boating activity. Because the number of boats to be moored at the new pier is small compared to the number of boats that use the navigation channel, we not expect any measurable increases in the level of boating activity.

2.4.2 Effects on Critical Habitat

Freshwater Rearing Sites and Freshwater Migration Corridors (PBFs 2 and 3)

As described above, pile removal will cause elevated suspended sediment and will temporarily degraded water quality. This will cause short-term and localized impairment of PBFs 2 and 3 in Lake Washington. There will be no permanent impacts to these PBFs from the elevated turbidity because the suspended sediment will rapidly settle, and water quality will return to pre-activity conditions.

Changes in over-water cover and number and size of piles will also impact PBFs 2 and 3 within the Portage Bay. Lack of excessive predation is a component of PBF 3. The decrease in in-water piles will decrease the availability of smallmouth bass habitat in the action area and improve PBF 3 (juvenile migration). Shading from the new pier will cause short term delays for a portion of actively migrating juveniles. However, the removal of 2,742 degrade PBF 3 for the reasons outlined above. As shown in Table 5 above, the increases in over-water cover (and therefore the increase in the number of piles that support over-water cover) will be extremely small relative to the amount of habitat available in the lake. The increases will not meaningfully change the conservation value of PBFs 2 and 3 at the scale of Portage Bay because they will not significantly change the habitat conditions in the two lakes.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

We did not find any future development activities that were both within the action area and did not involve Federal activities. Ongoing activities from the baseline, including boat activity, will continue into the future. The effects section above describes the effects of boating on listed species in the lakes and the difficulty separating how much of the activity is due to boats to be moored at the proposed pier. Effects from boating in the action area not associated with the new pier or other federal activities are cumulative effects. These effects likely contribute, in an un quantified way, to the low abundance of PS Chinook salmon in the Lake Washington watershed.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) 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 diminishes the value of designated or proposed critical habitat for the conservation of the species.

Puget Sound Chinook Salmon ESU

The current status of the ESU is poor. Abundance across the ESU has generally decreased between 2010 and 2014, with only 6 small populations of 22 total populations showing a positive change in natural-origin spawner abundances. Climate change is expected to make recovery targets for PS Chinook salmon more difficult to achieve. The ESU is split into five Major Population Groups (MPGs). The Lake Washington populations are within the South MPG along with the Green, White, Puyallup, and Nisqually populations. Recovery criteria for the ESU includes 2 to 4 Chinook populations in each of the MPGs within the ESU achieve viability and that the populations that do not meet the viability criteria for all 4 VSP parameters are sustained in order to provide ecological functions and preserve options for ESU recovery. Given the extensive and intense development in the Lake Washington watershed, the Lake Washington populations are the least likely in the South MPG to achieve viability (NWFSC 2015).

Within the action area, the shoreline modifications have degraded the environmental baseline for shoreline-dependent juvenile Chinook salmon. Boat traffic has contributed to the low abundance of the Lake Washington populations of PS Chinook salmon and will likely continue to have these effects into the future as described above.

The timing of in-water construction associated with the proposed action will avoid exposure of juvenile Chinook salmon to elevated suspended sediment. The response to the shading from the new pier will range from no response to a delay in migration of up to a few hours. The vast majority of actively migrating juvenile Chinook salmon will experience delays of less than an hour (Celedonia et al. 2009). Migration times from the Sammamish and Cedar Rivers to the locks in the Ship Canal averages between 13 and 16 days. Because the area of over-water cover for both the new pier and the deck removal cover is very minor compared to the available habitat in Portage Bay and the existing area of over-water cover, we do not expect the migration times or predation rates to be measurably changed. Similarly, the 16 new in-water piles and the 41 piles to be removed will not meaningfully change predation risk at the population level because the decrease will not significantly change the predation risk for any individual juvenile Chinook salmon.

The decrease in over-water cover will not be significant and will maintain the existing baseline conditions for PS Chinook salmon. The effects of the proposed action and the cumulative effects, when added to the environmental baseline, are likely to maintain the Lake Washington Chinook salmon populations at their current levels. Sustaining these populations will meet the recovery plan's goal of preserving options for ESU recovery.

<u>Puget Sound Chinook Salmon Critical Habitat</u>

The poor condition of critical habitat is the primary reason for the current status of the PS Chinook salmon ESU. PBFs 2 and 3 are present in the action area. The environmental baseline of the PBFs is degraded due to shoreline development. The CHART rated the conservation value of critical habitat in Lake Washington as "medium." The proposed action will temporarily affect PBFs 2 and 3 due to elevated suspended sediment. This effect is unlikely to cause a reduction in the conservation value of PBFs 2 and 3 because of the short duration and limited extent of each plume. Furthermore, the effects to PBFs 2 and 3 will be timed to avoid Chinook salmon. The decrease in over-water cover and piles will improve critical habitat by decreasing predation and migration delays. However, the effects to critical habitat from these decreases will not appreciably affect the current function of critical habitat because the increases are small relative to the current amount of habitat in Portage Bay. Overall, critical habitat will retain the current ability for PBFs to serve the intended conservation role for the species and will not affect the likelihood of recovery of the ESU. Therefore, the proposed action will not significantly reduce the conservation value of critical habitat at the ESU scale.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of Puget Sound Chinook salmon or destroy or adversely modify its designated critical habitat.

2.9. Incidental Take Statement

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

2.9.1 Amount or Extent of Take

In the biological opinion, we determined that the proposed action will cause incidental take of juvenile PS Chinook salmon by delaying migration and increasing the risk of predation. Accurately quantifying the number of fish taken as a result of is not possible. For take resulting from the creation of overwater structure, we use the total area of rearing and migratory habitat covered by the new pier as a habitat surrogate. This surrogate is proportional to the amount of take as we expect migration delays and additional vulnerability to predators with increasing coverage in Portage Bay. The take represented by this surrogate is equivalent to the maximum amount of take considered in our jeopardy analysis. Therefore, if the surrogate is exceeded, reinitiation of consultation will be required. This surrogate will function as an effective reinitiation trigger because, the area of habitat shaded by the new pier will be measured and reported. Take of juvenile PS Chinook salmon due to over-water cover is exempted for the 725 square feet of habitat impacted by the pier.

2.9.2 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.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). These reasonable and prudent measures are necessary and appropriate to minimize the take of PS Chinook salmon:

1. Minimize incidental take from over-water structures.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). 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.

The following terms and conditions implement reasonable and prudent measure 1:

The Corps shall monitor the amount of habitat shaded by the new pier and ensure no more than 725 square feet of habitat is covered by over-water structure upon completion of the project.

2.10. Reinitiation of Consultation

This concludes formal consultation for the Boat Street Marina project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.11. "Not Likely to Adversely Affect" Determinations

2.11.1 Puget Sound Steelhead

Lake Washington Basin steelhead are virtually extirpated (less than 10 adult fish per year). Pinniped predation on adult steelhead at the Ballard locks decimated the population (Foley 1995; NMFS 1997). Between 2000 and 2004, escapement averaged 38 fish (WDFW 2002). From 2005 to 2008, escapement continued to decline. The average escapement was 11 with a low of four in 2008. Since 2008, returns have been less than 10 fish each year (Friends of the Ballard Locks in litt.).

WDFW operates smolt traps in Bear Creek and the Cedar River to estimate the production of juvenile Chinook salmon, coho salmon, and steelhead. Between 2007 and 2009, WDFW captured one smolt per year in the Cedar River. In Bear Creek, WDFW capture one smolt in 2007 and 2008 and none in 2009 (Kiyohara and Volkhardt 2008; Kiyohara and Zimmerman 2009; 2011). There has been a loss of connectivity between the Duwamish (Green) and Snohomish rivers due to the virtual extirpation of steelhead in the Lake Washington basin.

In the Cedar River, wild steelhead are closely related to resident O. mykiss. Resident O. mykiss are abundant below Landsburg dam and are a native wild population. Marshall et al. (2004) found that resident Cedar River *O. mykiss* produce out-migrating smolts and speculated that steelhead could produce adult resident *O. mykiss*. They concluded that the conservation of resident *O. mykiss* is likely an important aspect of reducing extinction risk for steelhead.

The proposed action will increase suspended sediment in the action area. However, given the extremely low abundance of steelhead in the watershed, the chance of any individual steelhead being exposed to elevated suspended sediment from this project is discountable. Because juvenile steelhead are larger (greater than 140mm) and not shoreline dependent, the project will not affect their migration or risk of predation.

2.11.2 Southern Resident Killer Whales

The proposed action will not have any direct effects on Southern Resident killer whales (SRKWs) or their critical habitat. However, the project may indirectly affect the quantity of prey available to Southern Residents. Any salmonid take up to the aforementioned maximum extent and amount would result in an insignificant reduction in adult equivalent prey resources for SRKWs that may intercept these species within their range. The Lake Washington populations of Chinook salmon are an extremely small proportion of the total number of fish available to SRKWs. The proposed action will not significantly reduce the abundance of these populations. Therefore, we concur with the determination that the proposed action may affect, but is not likely to adversely affect SRKWs.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific Coast salmon (PFMC 2014) 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 proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of Chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*), but does not occur within a Habitat Area of Particular Concern.

3.2. Adverse Effects on Essential Fish Habitat

We determined that the proposed action will have adverse effects to EFH designated for Chinook salmon and coho salmon, based on the analysis of effects presented in the ESA portion of this document. The proposed action will adversely affect EFH by temporarily elevating suspended sediment levels and increasing over-water cover. The amount of EFH that will be adversely by shading from over-water structures is 725 square feet per year in Lake Washington.

3.3. Essential Fish Habitat Conservation Recommendations

We expect full implementation of these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2 above, approximately 120.5 acres per year of designated EFH for Pacific coast salmon. We recommend that the Corps track the net change in over-water cover in Portage Bay and ensure that there is no net increase.

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, [*insert agency name*] 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 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. Other interested users could include the UW, the City of Seattle, and the general public. Individual copies of this opinion were provided to the Corps. The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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