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

Refer to NMFS No.:
WCRO-2020-01574

July 12, 2021

Michelle Walker
Corps of Engineers, Seattle District
Regulatory Branch CENWS-OD-RG
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the North Creek Levee Repair, King County, Washington, USACE Number: NWS-2018-927, HUC: 171100120302 – Lower Sammamish River.

Dear Ms. Walker:

Thank you for your email of June 10, 2020, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NOAA) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for U.S Army Corps of Engineers (USACE) authorization of the North Creek Levee Repair project. 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 (MSA)(16 U.S.C. 1855(b)) for this action.

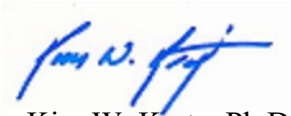
The enclosed document contains the biological opinion (Opinion) prepared by NOAA pursuant to section 7(a)(2) of the ESA on the effects of the proposed action. In this Opinion, NOAA concludes that the proposed action is likely to adversely affect but not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon and PS steelhead. The project is not within critical habitat for either species. As required by section 7 of the ESA, NOAA has provided an incidental take statement with this Opinion.

The incidental take statement describes reasonable and prudent measures NOAA considers necessary or appropriate to minimize the impact of incidental take associated with this action, and sets forth nondiscretionary terms and conditions that the COE must comply with to meet those 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.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to Section 305(b) of the MSA. NOAA reviewed the likely effects of the proposed action on EFH, and concluded that the action would adversely affect designated EFH for Pacific Coast Salmon. Therefore, we have included the results of that review in Section 3 of this document, and provided three conservation recommendations. Please review that section to ensure you comply with the EFH response requirements.

Please contact David Price in the North Puget Sound Branch of the Oregon/Washington Coastal Office at 253-317-1498, or by electronic mail at david.price@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: Colleen Anderson, USACE

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the

North Creek Levee Repair
King County, Washington
USACE Number: NWS-2018-927, HUC: 171100120302 – Lower Sammamish River

NOAA Consultation Number: WCRO-2020-01574

Action Agency: U.S. Army Corps of Engineers

Affected Species and 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?
Chinook salmon (*Oncorhynchus tshawytscha*) Puget Sound (PS)	Threatened	Yes	No	N/A	N/A
Steelhead (*O. mykiss*) PS	Threatened	Yes	No	N/A	N/A

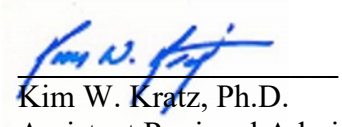
N/A = not applicable. The action area is outside designated critical habitat, or critical habitat has not been designated.

Affected Essential Fish Habitat (EFH) and NMFS' Determinations:

Fishery Management Plan That Describes 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: July 12, 2021

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 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 (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 at the Oregon Washington Coastal Office.

1.2 Consultation History

On June 10, 2020, NOAA received an email from the US Army Corps of Engineers (USACE) requesting new formal consultation for the proposed action. The USACE request for initiation of formal consultation was preceded by the USACE's Memorandum for the Services (MFS), dated October 19, 2019; Biological Evaluation (BE) for the proposed action dated May 31, 2019; project drawings, dated August 9, 2019; Fish Exclusion and Construction Dewatering Plan, dated June 6, 2019; North Creek Existing Hydraulic Conditions Memorandum, dated May 23, 2019; and Talasaea Response to Comments from NMFS, dated June 9, 2020. After email exchanges between June 10, 2020 and July 24, 2020 clarifying project scope and effects, formal consultation was initiated on July 27, 2020.

This Opinion and MSA consultation are based on the review of the information and project drawings identified above. The Opinion also relies on recovery plans, status reviews, and critical habitat designations for ESA-listed PS Chinook salmon and PS steelhead; published and unpublished scientific information on the biology and ecology of those species; and relevant scientific literature (see Literature Cited). A complete record of the combined consultation document is on file at the Oregon Washington Coastal Office (OWCO) in Lacey, Washington.

1.3 Proposed Action

"Action" under the ESA 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). "Federal action" under the

MSA 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 proposes to authorize the repair of the North Creek levee in Bothell, Washington. The levee has experienced damage in two locations, increasing the likelihood that a failure could occur, which could result in damage to commercial buildings and properties. The North Creek Maintenance District (NCMD) is considering solutions to repair the damaged levee banks and prevent future erosion. The proposed work is intended to restore and stabilize the levee at 2 locations (Stations 13 and 33). Material will be placed below the OHWM where erosion has expanded the OHWM of North Creek by cutting into the levee.

Bank toe erosion near Station13 has caused a portion of the interior levee prism to slough toward the channel. For Station 13, approximately 80 CY of permeable ballast will be placed below OHWM (fill) to support the side and toe of the inside edge of the levee. Boulders (63 CY), rootwads (12 CY), and anchor rocks (9.5 CY) will be added to stabilize the damaged of the levee. Soil and vegetation will be placed above the OHWM.

Slow and continuous erosion of the stream bank at Station 33 has been observed since levee monitoring began in 2009. The severity of the bank erosion worsened recently when two large trees, including a 45 foot cottonwood tree, fell from the riparian area into the channel allowing for bank scour to occur behind the root ball. At this site, approximately 250 CY of Class A scour protection and 70 CY of launchable Class A scour protection will be placed below OHWM. Approximately 17.5 CY of rootwads and 19 CY of anchor rock will be placed to stabilize the damaged area of the levee. Additional materials, including soil, soil lifts (Bio D block), crushed rock, and red-osier dogwood stakes will be placed above the OHWM to complete the levee reconstruction. Detailed descriptions of the proposed project are located in the BE (Talasaea 2019) and hydraulic report (Watershed 2018), and are incorporated here by reference. To minimize impacts to ESA-listed species, the work would be conducted during the approved work window for tributaries to the Sammamish River: July 16-July 31.

Large woody debris features will be placed streamward of the rock anchors to roughen the bank, reduce velocities and scour, and to deflect the stream toward the thalweg. Orientation of the wood will not direct flow into the opposite bank. Wood will be laid with the rootward extending into the channel, angled slightly upstream, and ballasted with large rock to maintain appropriate alignment and to prevent floatation or shifting which could damage the repaired levee prism.

The portion of the failed cottonwood tree, which currently spans the channel, is proposed to be removed to avoid debris and wood racking on the downed tree causing increased flood levels and additional scour and erosion. The applicant has proposed that the cottonwood rootwad can remain in place and be integrated into the proposed bank protection to provide roughness and complexity to the bank assuming that geotechnical considerations do not require the rootwad to be removed or reoriented.

Fish exclusion plan
The overall concept of stream bypass at Station 13 and 33 is to construct a diversion structure upstream of the meander that directs flow towards the work area. The diversion structure will

divert flow into existing side channels towards the wetland area downstream of the site. Supplemental block dams will likely be required downstream of the work area to prevent backwater, and upstream of the work area along a small, slow-flowing side channel adjacent to the western levee.

Once upstream nets are installed, seine nets should be used to perform an initial sweep of the work area at both stations. This initial pass can be bolstered by additional staff equipped with dip nets walking ahead of the seiners attempting to spook fish from hiding cover (undercut banks, large rocks, logs, etc.) and into the seine. Multiple passes may be required to effectively operate around some obstructions. Two block dams should be constructed. One north of the work area to block upstream flow and one downstream of the work area to prevent backwater from entering the work area. Following construction water should be gradually metered back into the work area to minimize turbidity. Additional details of the fish exclusion structures and fish removal operations can be found in the Fish Exclusion and Construction Dewatering Plan (GeoEngineers (2019), and is incorporated here by reference.

Conservation measures and best management practices proposed by the applicant include:

- Provide silt fencing, straw bales, straw wattles, and vegetated strips to prevent silt and sediment-laden water from leaving the work areas;
- Protect storm drain and catch basin inlets using filter fabric, gravel, and check dams in areas that may receive sediment-laden water from the proposed work areas;
- Stabilize soil and disturbed slopes using temporary or permanent seeding, mulching, nets, blankets, plastic coverings, sod, check dams, and triangular silt dikes;
- Control pollutants by regular inspection of vehicles and petroleum dispensing equipment for leaks, provide secondary containment for petroleum storage containers, ensuring proper chemical storage, and maintaining emergency spill containment and clean-up materials on-site;
- Control dust from construction activities;
- Containment of demolition material and debris, including collection and treatment of process water and slurry;
- Control, containment, and treatment of water removed from the construction area.

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 habitat. 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.

Table 1. ESA listed species likely affected by the action

Species	Status	Listing	Listing Date	Critical Habitat Designation
Puget Sound Chinook	Threatened	64 FR 14308	3/24/1999	N/A
Puget Sound Steelhead	Threatened	72 FR 26722	6/11/2007	N/A

2.1 Analytical Approach

This Opinion includes a jeopardy 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.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition 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 to cause the destruction or adverse modification of designated critical habitat:

- Evaluate the rangewide 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 habitat using an exposure-response approach. Effects on individuals of species are then evaluated, if possible, for the influence on the population they comprise.
- 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.

2.2 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 includes the lower end of North Creek (Rm 1.5) downstream to and including the confluence with the Sammamish River (Figure 1). The action area is defined by the extent of anticipated elevated suspended sediment that may reasonably be detected as a result of construction activities from the project.

This action area overlaps with the geographic ranges and boundaries of the ESA-listed species (Table 1). The action area also overlaps with areas that have been designated, under the MSA, as EFH for Pacific Coast salmon. The Sammamish River watershed, including North Creek, is not included in the critical habitat designation for PS Chinook salmon (70 FR 52630) or PS steelhead (81 FR 9252).

Figure 1. North Creek levee repair site showing locations of stream erosion (Station 13 and 33). Credit: Google Earth.

2.3 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 summaries that follow describe the status of the ESA-listed species that occur within the action area and are considered in this Opinion. More detailed information on the biology, habitat, and conservation status and trend of these listed resources can be found in the listing regulations published in the Federal Register and in the recovery plans and other sources at: http://www.nmfs.noaa.gov/pr/species/fish/, and are incorporated here by reference.

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 et al. 2014, Mote 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Mote et al. 2014).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F 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°F, with the largest increases predicted to occur in the summer (Mote 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 (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and 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°C increases in Columbia Basin streams and a peak temperature of 26°C 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 (Mantua et al. 2010; Isaak et al. 2012). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic food webs (Crozier et al. 2011; 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; Winder and Schindler 2004, Raymondi et al. 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Wainwright & Weitkamp 2013; Raymondi et al. 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 (McMahon and Hartman 1989; Lawson et al. 2004).

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°C 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 (Tillmann and Siemann 2011, Reeder et al. 2013).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. A 38% to 109% increase in acidity is projected by the end of this century in all but the most stringent CO_2 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 (Tillmann and Siemann 2011, Reeder et al. 2013). 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 (Tillmann and Siemann 2011, Reeder et al. 2013).

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 evolutionarily significant units (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.

2.3.1 Status of the Species

For Pacific salmon, steelhead, and certain other species, we commonly use the four "viable salmonid population" (VSP) criteria (McElhany et al. 2000) to assess the viability of the populations that, together, constitute the species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits (McElhany et al. 2000).

"Abundance" generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle (i.e., the number of naturally-spawning adults produced per parent). When progeny replace or exceed the number

of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany et al. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of the long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany et al., 2000). Additional information is available at NOAA's West Coast Region website; http://www.westcoast.fisheries.noaa.gov/).

Puget Sound Chinook salmon

The Puget Sound Chinook salmon evolutionarily significant unit (ESU) was listed as threatened on June 28, 2005 (70 FR 37160). We adopted the recovery plan for this ESU in January 2007. The recovery plan consists of two documents: the Puget Sound salmon recovery plan (Shared Strategy for Puget Sound 2007) and a supplement by NMFS (2006). The recovery plan adopts ESU and population level viability criteria recommended by the Puget Sound Technical Recovery Team (PSTRT) (Ruckelshaus *et al.* 2002). The PSTRT's biological recovery criteria will be met when all of the following conditions are achieved:

- The viability status of all populations in the ESU is improved from current conditions, and when considered in the aggregate, persistence of the ESU is assured;
- Two to four Chinook salmon populations in each of the five biogeographical regions of the ESU achieve viability, depending on the historical biological characteristics and acceptable risk levels for populations within each region;
- At least one population from each major genetic and life history group historically present within each of the five biogeographical regions is viable;
- Tributaries to Puget Sound not identified as primary freshwater habitat for any of the 22 identified populations are functioning in a manner that is sufficient to support an ESU-wide recovery scenario; Production of Chinook salmon from tributaries to Puget Sound not identified as primary freshwater habitat for any of the 22 identified populations occurs in a manner consistent with ESU recovery; and
- Populations that do not meet the viability criteria for all VSP parameters are sustained to provide ecological functions and preserve options for ESU recovery.

Spatial Structure and Diversity. The Puget Sound Chinook salmon ESU includes all naturally spawning populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Straits of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound and the Strait of Georgia in Washington. The ESU also includes the progeny of numerous artificial propagation programs

(NWFSC 2015). The PSTRT identified 22 extant populations, grouped into five major geographic regions, based on consideration of historical distribution, geographic isolation, dispersal rates, genetic data, life history information, population dynamics, and environmental and ecological diversity. The PSTRT distributed the 22 populations among five major biogeographical regions, or major population groups (MPG), that are based on similarities in hydrographic, biogeographic, and geologic characteristics (Table 2).

Between 1990 and 2014, the proportion of natural-origin spawners has trended downward across the ESU, with the Whidbey Basin the only MPG with consistently high fractions of natural-origin spawner abundance. All other MPG have either variable or declining spawning populations with high proportions of hatchery-origin spawners (NWFSC 2015). Overall, the new information on abundance, productivity, spatial structure and diversity since the 2010 status review supports no change in the biological risk category (NWFSC 2015).

Table 2. Extant PS Chinook salmon populations in each biogeographic region (PSTRT 2002, NWFSC 2015)

Biogeographic Region	Population (Watershed)
Strait of Georgia	North Fork Nooksack River
	South Fork Nooksack River
Strait of Juan de Fuca	Elwha River
	Dungeness River
Hood Canal	Skokomish River
	Mid Hood Canal Rivers
Whidbey Basin	Skykomish River
	Snoqualmie River
	North Fork Stillaguamish River
	South Fork Stillaguamish River
	Upper Skagit River
	Lower Skagit River
	Upper Sauk River
	Lower Sauk River
	Suiattle River
	Upper Cascade River
Central/South Puget Sound Basin	Cedar River
	North Lake Washington/ Sammamish River
	Green/Duwamish River
	Puyallup River
	White River
	Nisqually River

Abundance and Productivity. Available data on total abundance since 1980 indicate that although abundance trends have fluctuated between positive and negative for individual populations, there are widespread negative trends in natural-origin Chinook salmon spawner abundance across the ESU (NWFSC 2015). Productivity remains low in most populations, and hatchery-origin spawners are present in high fractions in most populations outside of the Skagit watershed. Available data now shows that most native-origin populations have declined in

abundance over the past 20 years, including the Lake Washington/Samammish River population (Figure 2). Further, 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).

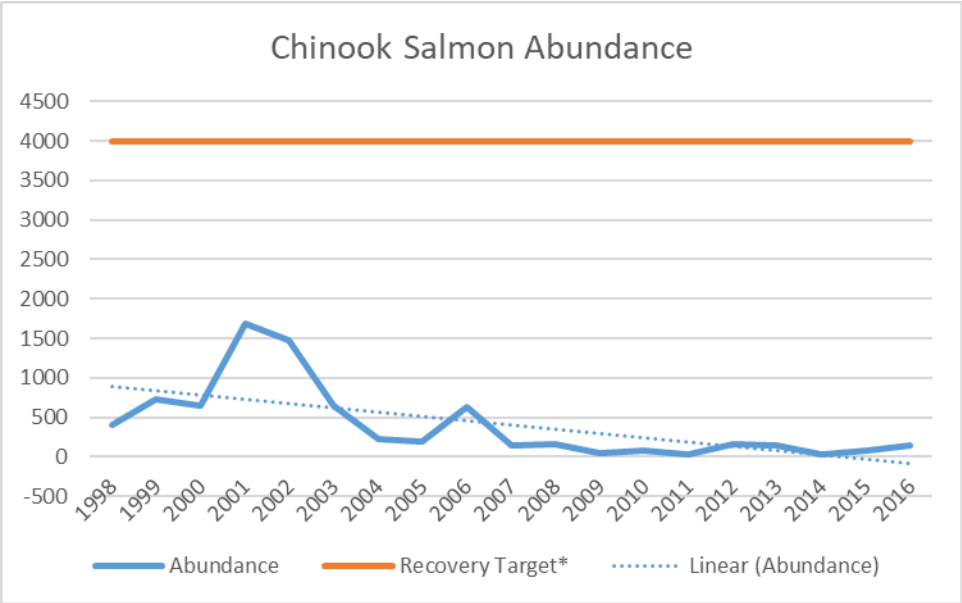


Figure 2. Abundance trends of native-origin Chinook salmon in the Lake Washington/ Sammamish River population. * indicates recovery target at low production levels.

Limiting Factors. Limiting factors for this species include:

- Degraded floodplain and in-river channel structure
- Degraded estuarine conditions and loss of estuarine habitat
- Riparian area degradation 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
- Altered flow regime

Puget Sound 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 *et al.* 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. NMFS (2019) identify several criteria for the viability of the DPS, including that a minimum of 50 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 et al. (2015).

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 (NWFSC 2015). 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 et al. 2015). More information on PS steelhead spatial structure and diversity can be found in NMFS' technical report (Hard et al. 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. Several population abundance 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 2015 review, at least for some populations, especially in the Hood Canal & Strait of Juan de Fuca MPG (NWFSC 2015). 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), including populations within the Lake Washington/Sammamish River drainage where abundance in recent years has fluctuated between 0 and 10 native-origin steelhead.

Limiting factors. The PS steelhead recovery plan identified the following limiting factors (NMFS 2019):

- Fish passage barriers at road crossings;
- Dams, including fish passage and flood control;
- Floodplain impairments, including agriculture;
- Residential, commercial, industrial development (including impervious runoff);
- Timber harvest management;
- Water withdrawals and altered flows;
- Ecological and genetic interactions between hatchery- and natural-origin fish;
- Harvest pressures (including selective harvest) on natural-origin fish; and
- Juvenile mortality in estuary and marine waters of Puget Sound.

2.4 Environmental Baseline

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

The Sammamish River valley has been extensively developed beginning in the mid-1800s. Prior to European settlement, the Sammamish River valley, including North Creek, featured large wetlands and braided stream channels bordered by old growth forest. Over the last 150-170 years, the floodplain has degraded as a result of historic timber harvest, agricultural practices, and ultimately, urban and suburban development. The Sammamish River was historically utilized for transportation and commerce from Lake Washington. The channel was dredged and narrowed to form a navigable waterway, which included the removal of logs and log jams from stream channels to facilitate boat passage (King County 2020).

North Creek is roughly 12.6 miles long, draining approximately 19,000 acres of the largely urbanized basin. The headwaters of North Creek are primarily composed of dense commercial and multi-family residential developed properties. The middle reaches of North Creek include the city of Mill Creek and rural residential parcels. The Action Area includes the lower reach of North Creek, which is channelized with commercial and industrial parks, rural residential areas, and isolated wetlands. The North Creek watershed is 85% developed with extensive dikes and levees lining the stream channel for much of the length (King County 2020).

The action area provides migratory, spawning, and rearing habitat for adult and juvenile PS Chinook salmon and PS steelhead. Therefore, those fish must pass through or close to the action area twice to reproduce; first as out-migrating juveniles, then again as returning adults.

The existing levee system was elevated at least three feet in 2009 to protect the levee from the 1% flood exceedance level. The existing levee is part of the environmental baseline and is not evaluated further in this Opinion. The levee repairs that configure the flow and channel and add material to the levee, riparian area, and stream channel are evaluated for effects as described below.

2.5 Effects of the Action

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

The effects of the proposed action include in this analysis are: (1) Construction activities, (2) flow diversion, and fish exclusion and displacement, and (3) permanent channel and levee changes.

Construction activities

Temporarily Degraded Water Quality

Degraded water quality is expected to include pulses of fine sediment into the stream channel, creating suspended sediment/turbid conditions, despite use of sediment retention best practices. These conditions could be temporary or intermittent, but occur frequently over the construction period.

Areas where sediment is disturbed by in-or near water construction activities will disturb and diminish benthic prey communities. In areas where suspended sediment settles on the bottom, some smothering can occur which also disrupts the benthic communities. The speed of recovery by benthic communities is affected by several factors, including the intensity of the disturbance, with greater disturbance increasing the time to recovery (Dernie et al. 2003). 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.

Flow diversion, and fish exclusion and displacement

Reduction in Quality, Quantity and Availability of Prey and Forage

Placement of a diversion upstream of the construction site will divert flow into a side channel and stream-adjacent wetland complex (Station 13). This structure will reduce the abundance of prey organisms in the action area and also affects habitat complexity by reducing aquatic vegetation and mobilizing sediment in the side channel. The second diversion (Station 33) will route flow through a pipe, which will reduce scour of the stream sediments, but prevent fish from accessing the habitat or prey from the site. These anticipated effects will lower the quantity and quality of habitat in the action area for as long as the structures remain in place.

Fish removal will occur at both stations. The applicant proposes to use seines to herd fish from the construction sites.

Permanent channel and levee changes

Permanent habitat loss

The applicant proposes to constrict the existing channel using rock, rootwads, and soil lifts. Trees are proposed for removal from the channel and riparian vegetation planting is planned. For Station 13, approximately 80 CY of permeable ballast will be placed below OHWM (fill) to support the side and toe of the inside edge of the levee. Sixty three cubic yards (CY) of streambed boulders, 12 CY of rootwads, and 9.5 CY of anchor rocks will be added to stabilize the rootwads. Soil will be placed above the OHWM to facilitate vegetation growth. For Station 33, approximately 250 CY of Class A riprap and 70 CY of Class A scour protection will be placed below OHWM. Approximately 17.5 CY of rootwads and 19 CY of anchor rock will be placed to stabilize the rootwads. Additional materials, including soil, soil lifts (Bio D block), crushed rock, and red-osier dogwood stakes will be placed above the OHWM to complete the levee reconstruction.

The applicant also proposes to remove an existing 40’ cottonwood tree from the channel to prevent scour against the bank and to prevent debris from wracking against the tree, altering the direction of flow.

2.5.1 Effects on Listed Species

Effects on listed species is a function of (1) the numbers of fish exposed to habitat changes or direct effects of an action; (2) the duration, intensity, and frequency of exposure to those effects; and (3) the life stage at exposure. This section presents an analysis of exposure and response.

The project will have temporary and permanent effects. Our exposure and response analysis identifies the multiple life stages of listed species that use the action area, and whether they would encounter these effects as different life-stages of a species may not be exposed to all effects, and when exposed, can respond in different ways to the same habitat perturbations.

Juvenile Puget Sound Chinook salmon are likely to have fully migrated to the marine environment during the proposed work window. Very few of these fish, if any, migrate through the action area during the work window. The work window avoids peak juvenile Chinook salmon presence from mid-July through late-July, but does not fully avoid exposure as some juvenile Chinook salmon migrate to marine waters as late as August (Northcote 1976). Adult Chinook salmon return to spawn in the Lake Washington tributaries beginning in August, but the peak returns occur in September and early October. Thus, they are unlikely to be present during the construction window of July 16 – July 31.

Juvenile PS steelhead commonly reside if freshwater streams for 2-3 years. However, despite numerous spawning surveys in recent years, adult steelhead have not been observed in the Sammamish River or its tributaries. It is likely that juvenile *O. mykiss* encountered during the construction window are rainbow trout, which are indistinguishable from juvenile steelhead in the field. The proposed work window would minimize overlap of temporary construction effects with the juvenile PS steelhead (if present) in the action area.

It is unlikely that juvenile Chinook salmon or steelhead will be encountered during construction activities or during the installation and operation of the fish diversion structure due the well-developed work windows (for Chinook salmon) and the extremely low abundance of steelhead in the Sammamish watershed.

Species Response to Habitat Changes

A permanent loss of instream habitat would occur due to bank stabilization and filling newly formed habitat with rock, including 491 cubic yards of rock. These structures will occur on the outside bend of the river where riparian habitat is currently limited. However, the addition of the rip rap will preclude riparian habitat or instream structures (such as the deposition of large wood) from occurring. The large cottonwood tree which currently provides habitat for juvenile salmon would be removed under the proposal. The proposal also adds large wood to the structure to deflect flow away from the levee. This action may improve habitat by creating microhabitat for juvenile Chinook salmon.

The altered levee will disrupt prey abundance. The temporal extent of disruptions to benthic feeding will extend for months, as benthic invertebrate populations within the excavation area will be absent or reduced until the new surface layer is fully recolonized. Benthic food items also will be temporarily reduced by deposition of sediment, both as it is excavated during construction and as the diverted stream is reintroduced to the construction site. The loss of prey in the work area would be temporary, and when flow returns to the area, benthic macroinvertebrates from outside the dewatered area would return. The effects on benthic productivity and availability of prey items are likely to last several months after construction is completed until sediments in the area are recolonized.

Based on the foregoing analysis, effects on food items are likely to have minor, localized effects on juvenile salmonids rearing in the action area for a period of months following project construction. Short term change in prey availability and the disturbance to the benthic community at the site will not alter generally available feeding opportunities for salmonids

elsewhere in the river. It is unlikely that the proposed action will result in measurable changes to the forage community over the long term.

We cannot estimate the number of individual fish that will experience adverse effects from the reduction in quality and quantity of prey and foraging habitat. These anticipated effects will persist as long as the structure remains in place, lowering the quantity and quality of the forage in the action area over several weeks or months. While juvenile PS Chinook salmon use the action area, the absence of steelhead make them unlikely to realize negative effects. However, the addition of large wood (root wads) will have a benefit to juvenile salmon, including cover from predators and for prey production.

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 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. 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 (Section 2.4).

The current condition of ESA-listed species within the action area are described in the Status of the Species and the Environmental Baseline sections above. The contribution of non-federal activities to those conditions include past and on-going bankside development in the action area, as well as upstream forest management, agriculture, urbanization, road construction, water development, and restoration activities. Those actions were driven by a combination of economic conditions that characterized traditional natural resource-based industries, general resource demands associated with settlement of local and regional population centers, and the efforts of conservation groups dedicated to restoration and use of natural amenities, such as cultural inspiration and recreational experiences.

NMFS is unaware of any specific future non-federal activities that are reasonably certain to affect the action area. However, NMFS is reasonably certain that future non-federal actions such as upstream construction activities are likely to continue and increase in the future as the human population continues to grow across the region. Continued habitat loss and degradation of water quality from development and chronic low-level inputs of non-point source pollutants will likely continue into the future. For example, the private levee adjacent to North Creek has been repaired an average of every 5 years and efforts to stabilize the channel have met with a continued cycle of storm damage and subsequent repair. Recreational and commercial use of the waters within the action area are also likely to increase as the human population grows.

The intensity of these influences depends on many social and economic factors, and therefore is difficult to predict. Further, the adoption of more environmentally acceptable practices and standards may gradually reduce some negative environmental impacts over time. Interest in restoration activities has increased as environmental awareness rises among the public. State, tribal, and local governments have developed plans and initiatives to benefit ESA-listed PS Chinook salmon and PS steelhead within many of the watersheds that flow into the action area. However, the implementation of plans, initiatives, and specific restoration projects are often subject to political, legislative, and fiscal challenges that increase the uncertainty of their success.

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 Opinion as to whether the proposed action is likely to: (1) appreciably reduce 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 for the conservation of the species.

Two listed species considered in this Opinion are threatened with extinction (PS Chinook, and PS steelhead). Each species' listing status is due in part to low abundance, and low productivity. PS steelhead and PS Chinook salmon each have reduced diversity and spatial structure. Factors that limit productivity for the salmonids include habitat degradation in many areas within their geographic range or their designated critical habitat. Many of the baseline conditions are considered limiting.

As described in more detail above at Section 2.4, climate change is likely to increasingly affect the abundance and distribution of the ESA-listed species considered in the Opinion. The exact effects of climate change are both uncertain, and unlikely to be spatially homogeneous. However, climate change is reasonably likely to cause reduced instream flows in some systems, and may impact water quality through elevated in-stream water temperatures and reduced dissolved oxygen, as well as by causing more frequent and more intense flooding events.

Climate change may also impact coastal waters through elevated surface water temperature, increased and variable acidity, increasing storm frequency and magnitude, and rising sea levels. The adaptive ability of listed-species is uncertain, but is likely reduced due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. The proposed action will cause effects on the ESA-listed species and critical habitats considered in the Opinion well into the foreseeable future. However, the action's effects on water quality, substrate, and the biological environment are expected to be of such a small scale that no detectable effects on ESA-listed species or critical habitat through synergistic interactions with the impacts of global climate change are expected.

Cumulative effects of non-federal activities, and are generally derivative human population growth and development in the upland environment. Over the foreseeable future, the human

population is expected to continue growing, intensifying land and water use, will continue to add incremental degrading effects on water quality in the action area.

2.7.1 Effects to Species at the Population Scale

The current extinction risk for PS Chinook salmon is moderate to high, and the recovery goal for this ESU is to have very low extinction risk. The current extinction risk for PS steelhead is moderate to high and the recovery goal for this DPS is to have very low extinction risk (NWFSC 2015). All juvenile PS Chinook salmon and PS steelhead from these populations must migrate to the ocean through the action area. Therefore, individuals from these two species could potentially be affected by the proposed action. Currently the PS Chinook salmon population considered in this consultation is at high risk of extinction. The PS steelhead population considered in this consultation is at extremely high risk of extinction (NWFSC 2015). Over the past several years, NMFS has engaged in various section 7 consultations on Federal projects affecting these populations and their habitats, and those effects have been taken into account in this Opinion as part of the environmental baseline.

The environmental baseline is such that individual ESA-listed salmonids in the action area are exposed to degraded water quality conditions, lack of suitable riparian and aquatic habitat, and restricted movement due to residential, industrial, commercial and agricultural development, construction and maintenance of riverine infrastructure, and other changes in land use practices. These stressors, as well as those from climate change, already exist and are in addition to any adverse effects produced by the proposed action. Major factors limiting recovery of the ESA-listed salmonids considered in this Opinion include degraded freshwater habitat; degraded water quality; degraded floodplain connectivity and function; reduced access to spawning and rearing habitats due to impaired passage; altered streamflow; predation/competition; hatchery impacts; and disease. The proposed action will affect two of the factors limiting recovery for the ESA-listed salmonids considered in this Opinion by causing a permanent loss of habitat quality in the action area and a temporary loss of prey abundance.

The reduction in prey abundance affecting listed species will be from the temporary increase in suspended sediment during excavation and backfilling. These effects will be intermittent during actual operations over the short term (at most, 2.5 months) and limited to a relatively small area. Because these effects are relatively brief or small in scale, survival and recovery of ESA-listed salmonids will not be affected. This is primarily because the number of fish within the action area during construction activities will be very low when compared to the total abundance of individuals within the populations affected by this action. The cumulative effects described above should have a neutral to slightly negative effect on ESA-listed populations.

In summary, given the rangewide status of the species likely to be adversely affected by the proposed action, the environmental baseline in the extensive action area, the effects of the proposed action on species, and cumulative effects in the action area. The proposed action poses a chronic, and additive risk to listed species considered in this Opinion, but at a scale and intensity which cannot be distinguished from existing conditions or population trends.

2.8 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 cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of PS Chinook salmon or PS steelhead.

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 incidental take statement (ITS).

Accordingly, this ITS provides a take exemption for the USACE and applicant for any take caused by the direct effects of the proposed action and resulting structure. Those direct effects are injury or death caused by fish exclusion and handling, temporary and permanent loss of forage, the increase in rock and extension of the levee into the active channel, and harm associated with a temporary increase in suspended sediments during in-water work.

2.9.1 Amount or Extent of Take

NMFS determined that incidental take is reasonably certain to occur in the form of harm in the following manner:

Harm of PS Chinook salmon (juvenile, adults) and PS steelhead (juvenile, adults) from exposure to:

- Entrapment and Fish Handling; this harm will result in injury or death
- Temporary reduction of forage base associated with water quality reductions and benthic excavation
- Temporary loss of riparian vegetation and instream trees.
- Permanent habitat loss from rip rap fill and channel encroachment.

NMFS cannot predict the number of PS Chinook salmon or PS steelhead that are reasonably certain to be injured or killed by exposure to any of these stressors. The distribution and abundance of the fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and

environmental characteristics that vary over time. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Additionally, NMFS knows of no device or practicable technique that would yield reliable counts of individuals that may experience these impacts, either from habitat-related harm, or from entrainment. In such circumstances, NMFS uses the likely extent and duration of changes in habitat conditions that are causally linked to harm, to describe the extent of take as a measurable and verifiable metric.

For this proposed action, the most appropriate surrogates for take are action-related parameters directly influence the area in which harm will occur, or the duration of the harming activities.

Accordingly, the extent of take in the form of harm:

- from temporary reduced prey base associated with construction impacts extending for 400 meters radially from construction site for 16 days during 2 work windows.
- from entrainment is 200 M that will be diverted for 16 days over two work windows.
- from permanent reduced prey base associated with presence of altered levee alignment of 500 feet (total for both stations).

Exceedance of any of the exposure limits described above would constitute an exceedance of authorized take that would trigger the need to reinitiate consultation.

Although these take surrogates could be construed as partially coextensive with the proposed action, they nevertheless function as effective re-initiation triggers. If the size and configuration of the structure exceeds the proposal, it could still meaningfully trigger re-initiation because the Corps has authority to conduct compliance inspections and to take actions to address non-compliance, including post-construction (33 CFR 326.4).

2.9.2 Effect of the Take

In the Opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to jeopardize the continued existence of PS Chinook salmon and PS steelhead.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" (RPMs) are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02).

The COE shall require the applicant to:

1. Implement monitoring and reporting to confirm that the Take exemption for the proposed action is not exceeded.
2. Reduce take through application of effective construction Best Management Practices.
3. Reduce take through application of effective flow diversion management.
4. Minimize the take associated with the loss of habitat functions resulting from placement of the repaired levee structure.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary. The COE or any applicant must comply with them in order to implement the RPM (50 CFR 402.14). The COE 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. To implement RPM number 1, the applicant shall implement a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, the applicant shall collect and report details about the discharge of turbidity coming from construction. That plan shall:
    a. Include monitoring of turbidity from the construction, operation, and removal of the flow diversion structure.
    b. Utilize sampling and testing methodologies approved by WA department of Ecology.

2. To implement RPM number 2, the USACE shall require the applicant to implement the construction BMPs described in the BE.

3. To implement RPM number 3, the applicant shall minimize and document Take of listed species during construction by;
    a. Use seine nets during diversion dam construction.
        i. Use nets to corral, herd, collect and remove fish from the diversion block nets and structure.
    b. Monitoring of construction site during diversion dam assembly and disassembly;
        i. Identify and enumerate salmonids found within the construction area or diversion area (including rainbow trout/juvenile steelhead).
        ii. Provide a copy of the monitoring report to NMFS post construction.

4. The following terms and conditions implement reasonable and prudent measure 4. To minimize incidental take resulting from the repaired levee, the applicant shall:

    a. Provide as-built images of the repaired levee and associated habitat features to NMFS

b. Submit an electronic post-construction report to NMFS within 12 months of project completion. Send the report to: projectreports.wcr@noaa.gov. Be sure to include Attn: WCRO-2020-01574 in the subject line.

2.10 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. The applicant should reorient in-stream fallen trees rather than remove them. If reorienting is not feasible, then retaining a portion of the trees with rootwads should be retained within the stream channel.
2. The applicant should set the levee back at Station 33 rather than encroach into the channel with rock.
3. Plant trees in the riparian area to offset trees removed during construction

2.11 Re-initiation of Consultation

This concludes formal consultation for the U.S. Army Corps of Engineers' authorization of the North Creek levee repair project in King County, Washington. As 50 CFR 402.16 states, re-initiation 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 habitats 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 habitats that was not considered in this Opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action.

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

Section 305(b) of the MSA directs Federal agencies to consult with NOAA on all actions or proposed actions that may adversely affect essential fish habitat (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 description of EFH for Pacific Coast salmon contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC 2014) 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 section 1 of this document. The waters and substrate of the Lake Washington/Sammamish River are designated as EFH for various life-history stages of Pacific Coast Salmon. EFH for Pacific salmon is identified and described in Appendix A in the Pacific Coast salmon fishery management plan (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

The ESA portion of this document describes the adverse effects of this proposed action on ESA-listed species and critical habitat, and is relevant to the effects on EFH for Pacific Coast Salmonids. Based on the analysis of effects presented in Section 2.5, the proposed action will cause small scale but chronic adverse effects on this EFH through direct and indirect physical, chemical, or biological alteration of the water and substrate, and through alteration of benthic communities, and the reduction in prey availability. Therefore, we have determined that the proposed action would adversely affect the EFH identified above.

3.3 Essential Fish Habitat Conservation Recommendations

The proposed action includes design features that are expected to reduce impacts on the quantity and quality of for Pacific Coast Salmon, Pacific Coast Ground fish, and Coastal Pelagic Species EFH. It also includes a conservation measure and BMP to minimize construction-related effects. While these conservation measures and BMPs are commendable, they are not sufficient to completely avoid or offset all effects to the listed EFH. Therefore, additional conservation recommendations pursuant to MSA (§305(b)(4)(A)) are necessary. The following conservation recommendations are prescribed:

1. The COE should encourage the applicant to develop a long-term plan to reduce the environmental impacts of their hard armoring. Suggested measures include:
    a. Develop strategies to widen stream corridors where constrained by levees, including the North Creek levee;
    b. Replant natural plantings along the shoreline in the riparian belt;
    c. Replace the large river rock proposed in the action with smaller appropriately sized beach sand and small cobble.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the USACE must provide a detailed response in writing to NOAA 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 NOAA' EFH Conservation Recommendations unless NOAA 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 NOAA 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, NOAA 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 USACE must reinitiate EFH consultation with NOAA 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 NOAA' 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 user of this Opinion is the USACE. Other users could include WA Dept. of Ecology, the governments and citizens of King County, the Muckleshoot Tribe, and other Native American Tribes. Individual copies of this Opinion were provided to the USACE. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NOAA 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 NOAA 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 NOAA 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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