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

Refer to NMFS No.:
WCRO-2018-00338

June 3, 2019

Michelle Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Seattle District
CENSW-OD-RG
Post Office Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Wahkiakum County Public Works Bridge Erosion Repair on Crooked Creek, Wahkiakum County, Washington. HUC 170800030900 (COE Number NWS-2017-915).

Dear Ms. Walker:

Thank you for your letter of November 16, 2018 requesting formal 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 Wahkiakum County Public Works Bridge Erosion Repair on Crooked Creek.

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 a biological opinion (opinion) that analyzes the effects of your proposal to repair the Eden Valley Bridge over Crooked Creek, in Wahkiakum County, Washington. In this opinion, we conclude that the proposed action, is not likely to jeopardize the continued existence of Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), LCR coho salmon (*O. kisutch*), LCR steelhead (*O. mykiss*), and will not result in the destruction or adverse modification of their designated critical habitats.

As required by section 7 of the ESA, we are providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures we consider necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the COE and any person who performs the action 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 take prohibition.

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 Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are not a subset of the ESA take statement's terms and conditions. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the essential fish habitat conservation recommendation, the COE must explain why the recommendation will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendation. In response to increased oversight of overall essential fish habitat 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 essential fish habitat consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the essential fish habitat portion of this consultation, you clearly identify the conservation recommendation accepted.

Please contact Chad Baumler, Lacey, Washington, 360-753-4126, Chad.Baumler@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: Danette Guy, COE

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

Wahkiakum County Public Works Bridge Erosion Repair on Crooked Creek
Wahkiakum County, Washington. HUC 170800030900
(COE Number NWS-2017-915)

NMFS Consultation Number: WCRO-2018-00338

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?
Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*)	Threatened	Yes	No	Yes	No
LCR steelhead (*O. mykiss*)	Threatened	Yes	No	NA	NA
LCR coho salmon (*O. kisutch*)	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 3, 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). The document will be available through NMFS' Environmental Consultation Organizer (https://eco.fisheries.noaa.gov). A complete record of this consultation is on file at NMFS Oregon Washington Coastal Area Office, Lacey, Washington.

1.2. Consultation History

On October 2, 2018, the U.S. Army Corps of Engineers, Seattle District (COE), sent a request for informal consultation and concurrence with not likely to adversely affect determinations. The request included a memorandum for services, biological evaluation, project drawings, and a mitigation plan.

On October 29, 2018, NMFS declined to concur with the COE's determinations that the action was not likely to adversely affect listed species and their critical habitat. NMFS also requested additional information related to LCR coho and their critical habitat.

On November 16, 2018, the COE responded by requesting formal consultation. NMFS determined the consultation package was complete and initiated consultation on November 26, 2018.

Consultation was held in abeyance for 38 days due to a lapse in appropriations and resulting partial government shutdown. Consultation resumed on January 28, 2019.

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). "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

The COE proposes to issue a permit under its Section 404 Clean Water Act authority for a county bridge repair at Crooked Creek in Wahkiakum County, Washington. Approximately 18 linear feet of bank underneath the bridge has eroded due to high flow events and has shifted the channel, putting the bridge abutment at risk of future erosion and failure. The applicant proposes to stabilize the bridge abutment with large and small riprap, and remove sloughed off material from the Eastern bank of the creek to allow the stream to flow along the original channel. Both project components are expected to take two days combined to complete.

The applicant will install the proposed riprap, large angular rock, by using a hydraulic excavator above the ordinary high water line. The rock will be placed at the scoured region along each side of the bridge abutment. Small rock will then be placed by hand behind and around the large rock as needed. The project design is for approximately 4-5 cubic yards of large rock and 2-3 cubic yards of small angular rock. No excavation will take place on the western bank of Crooked Creek.

The second phase of the project, to prevent future erosion during high flow events and reestablish the original channel, the applicant proposes to remove existing sloughed areas above and below the bridge on the eastern banks. The applicant will remove approximately 12 cubic yards, to be disposed of at an upland location.

The applicant plans to conduct all work when water levels are low enough to be working in the dry i.e., avoiding in-water work; if water volume is higher than expected during the work window, then the work area for both the placement of riprap and removal of sediment will be isolated by a sandbag barrier or silt fence. Fish exclusion protocols may include netting off the area both up and downstream of the project location; herding of fish out of the area using seining (but without removing any fish from flowing water); and any remaining fish within the worksite will be netted out before dewatering, and placed in the flowing channel.

The applicant will construct the project during the July 16 to September 15 work window that coincides with when salmon are least likely to be in the area. All heavy equipment will be operated from above the OHW line. During construction, contractors will employ standard construction best management practices.

There are no expected interrelated or interdependent actions.

1.4. Action Area

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

For this consultation, the action area is Crooked Creek at the project site (46.300 N, 123.640 W), and 150 feet downstream of the bridge, where increased turbidity caused by the riprap repair and removal of sediment are reasonably certain to occur. These effects bound the action area.

A total of three ESA-listed species use the action area for adult migration, and/or juvenile rearing and migration. Critical habitat has been designated for LCR coho and LCR chinook. The action area does not include critical habitat designated for LCR steelhead.

The action area is designated EFH for Chinook salmon and coho salmon (Pacific Fishery Management Council 2014), and is an area where environmental effects of the proposed action may adversely affect EFH of those species. The effects to EFH are analyzed in the MSA portion of the document at Section 3.

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.

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 of critical habitat for Lower Columbia salmonids use the term "primary constituent element" (PCE). 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, 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 rangewide 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. Rangewide 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.

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.

2.2.1 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 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).

The summaries that follow describe the status of the three ESA-listed species, and their designated critical habitats, that occur within the geographic area of this proposed action and are considered in this opinion.

Status of LCR Chinook Salmon

Recovery plan targets for this species are tailored for each life history type, and within each type, specific population targets are identified (NMFS 2013a). For spring Chinook salmon, all populations are affected by aspects of habitat loss and degradation. Four of the nine populations require significant reductions in every threat category. Protection and improvement of tributary and estuarine habitat are specifically noted.

For fall Chinook salmon, recovery requires restoration of the Coast and Cascade strata to high probability of persistence, to be achieved primarily by ensuring habitat protection and restoration. Very large improvements are needed for most fall Chinook salmon populations to improve their probability of persistence.

For late fall Chinook salmon, recovery requires maintenance of the North Fork Lewis and Sandy populations which are comparatively healthy, together with improving the probability of persistence of the Sandy population from its current status of “high” to “very high.” Improving the status of the Sandy population depends largely on harvest and hatchery changes. Habitat improvements to the Columbia River estuary and tributary spawning areas are also necessary. Of the 32 DIPs in this ESU, only the 2 late-fall run populations (Lewis River and Sandy River) could be considered viable or nearly so (NWFSC 2015).

Spatial Structure and Diversity. The ESU includes all naturally-produced populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls, Oregon, with the exception of spring-run Chinook salmon in the Clackamas River. On average, fall-run Chinook salmon programs have released 50 million fish annually, with spring-run and upriver bright (URB) programs releasing a total of 15 million fish annually. As a result of this high level of hatchery production and low levels of natural production, many of the populations contain over 50% hatchery fish among their naturally spawning assemblages.

The ESU spans three distinct ecological regions: Coastal, Cascade, and Gorge. Distinct life-histories (run and spawn timing) within ecological regions in this ESU were identified as major population groups (MPGs). In total, 32 historical DIPs were identified in this ESU, 9 spring-run, 21 fall-run, and 2 late-fall run, organized in 6 MPGs (based on run timing and ecological region; LCR Chinook populations exhibit three different life history types base on return timing and other features: fall-run (or “tules”), late-fall-run (or “brights”), and spring-run.

Abundance and Productivity. Of the seven spring-run DIPs in this MPG only the Sandy River spring-run population appears to be a currently self-sustaining population. Both of the two spring-run historical DIPs in the Spring-run Gorge MPG are extirpated or nearly so. In general, the DIPs in the Coastal Fall-run MPG are dominated by hatchery-origin spawners. In surveys conduct in both 2012 and 2013, no Chinook salmon were observed in Scappoose Creek. Overall, the Fall-run Cascade MPG exhibits stable population trends, but at low abundance levels, and most populations have hatchery contribution exceeding the target of 10% identified in the NMFS Lower Columbia River recovery plan (Dornbush and Sihler 2013). Many of the populations in the Fall-run Gorge MPG have limited spawning habitat available. Additionally, the prevalence of returning hatchery-origin fish to spawning grounds presents a considerable threat to diversity. Natural-origin returns for most populations are in the hundreds of fish. The two populations in the Late-Fall-run MPG the most viable of the ESU. The Lewis River late-fall DIP has the largest natural abundance in the ESU and has a strong short-term positive trend and a stable long term trend, suggesting a population near capacity. The Sandy River late-fall run has not been directly monitored in a number of years; the most recent estimate was 373 spawners in 2010 (Takata 2011).

Limiting factors. NMFS (2013a) identified the following limiting factors for this species:

- Reduced access to spawning and rearing habitat
- Hatchery-related effects

- Harvest-related effects on fall Chinook salmon
- An altered flow regime and Columbia River plume
- Reduced access to off-channel rearing habitat
- Reduced productivity resulting from sediment and nutrient-related changes in the estuary
- Contaminants

Status of LCR Coho Salmon

This species is included in the Lower Columbia River recovery plan (NMFS 2013a). Specific recovery goals are to improve all four viability parameters to the point that the Coast, Cascade, and Gorge strata achieve high probability of persistence. Protection of existing high functioning habitat and restoration of tributary habitat are noted needs, along with reduction of hatchery and harvest impacts. Large improvements are needed in the persistence probability of most populations of this ESU.

<u>Spatial Structure and Diversity</u>. This ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia River up to and including the Big White Salmon and Hood Rivers, and includes the Willamette River to Willamette Falls, Oregon, as well as multiple artificial propagation programs. Most of the populations in the ESU contain a substantial number of hatchery-origin spawners. Myers et al. identified three MPGs (Coastal, Cascade, and Gorge), containing a total of 24 DIPs in the Lower Columbia River coho salmon ESU (NWFSC 2015).

There have been a number of large-scale efforts to improve accessibility, one of the primary metrics for spatial structure, in this ESU. On the Hood River, Powerdale Dam was removed in 2010 and while this dam previously provided fish passage removal of the dam is thought to eliminate passage delays and injuries. Condit Dam, on the White Salmon River, was removed in 2011 and this provided access to previously inaccessible habitat. Fish passage operations (trap and haul) were begun on the Lewis River in 2012, reestablishing access to historically-occupied habitat above Swift Dam though, juvenile passage efficiencies are still relatively poor. Presently, the trap and haul program for the Upper Cowlitz, Cispus, and Tilton River populations are the only means by which coho salmon can access spawning habitat for these populations. A trap and haul program also currently maintains access to the North Toutle River above the sediment retention structure with coho salmon and steelhead being passed above the dam (NWFSC 2015).

<u>Abundance and Productivity</u>. Long-term abundances in the Coast Range Cascade MPG were generally stable. Scappoose Creek is exhibiting a positive abundance trend. Clatskanie River coho salmon population maintains moderate numbers of naturally produced spawners. Washington tributaries indicate the presence of moderate numbers of coho salmon, with total abundances in the hundreds to low thousands of fish. Oregon tributaries have abundances in the hundreds of fish. In the Western Cascade MPG, the Sandy and Clackamas Rivers were the only two populations identified in the original 1996 Status Review that appeared to be self-sustaining natural populations. Natural origin abundances in the Columbia Gorge MPG are low, with hatchery-origin fish contributing a large proportion of the total number of spawners, most notably in the Hood River. With the exception of the Hood and Big White Salmon Rivers, much

of the spawning habitat accessibility is relatively poor. There was no clear trend in the abundance data.

Limiting Factors. Limiting factors for this species include (NMFS 2013a):

- Degraded estuarine and near-shore marine habitat
- Fish passage barriers
- Degraded freshwater habitat: Hatchery-related effects
- Harvest-related effects
- An altered flow regime and Columbia River plume
- Reduced access to off-channel rearing habitat in the lower Columbia River
- Reduced productivity resulting from sediment and nutrient-related changes in the estuary
- Juvenile fish wake strandings
- Contaminants

Status of LCR Steelhead

This species is included in the Lower Columbia River recovery plan (NMFS 2013a). For this species, threats in all categories must be reduced, but the most crucial elements are protecting favorable tributary habitat and restoring habitat in the Upper Cowlitz, Cispus, North Fork Toutle, Kalama and Sandy subbasins (for winter steelhead), and the East Fork Lewis, and Hood, subbasins (for summer steelhead). Protection and improvement is also needed among the South Fork Toutle and Clackamas winter steelhead populations.

Spatial Structure and Diversity. The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive), as well as multiple artificial propagation programs. There are 4 MPGs comprised of 23 demographically independent populations (DIPs), including 6 summer-run steelhead populations and 17 winter-run populations that comprise (NWFSC 2015). Summer steelhead return to freshwater long before spawning. Winter steelhead, in contrast, return from the ocean much closer to maturity and spawn within a few weeks. Summer steelhead spawning areas in the Lower Columbia River are found above waterfalls and other features that create seasonal barriers to migration. Where no temporal barriers exist, the winter-run life history dominates.

There have been a number of large-scale efforts to improve accessibility (one of the primary metrics for spatial structure) in this ESU. Trap and haul operations were begun on the Lewis River in 2012 for winter-run steelhead, reestablishing access to historically-occupied habitat above Swift Dam. In 2016, 772 adult winter steelhead (integrated program fish) were transported to the upper Lewis River; however, juvenile collection efficiency is at 23.5 percent which is still below target levels of 95 percent. In addition, there have been a number of recovery actions throughout the ESU to remove or improve culverts and other small-scale passage barriers. Many of these actions (including the removal of Condit Dam on the White Salmon River) have occurred too recently to be fully evaluated.

Total steelhead hatchery releases in the Lower Columbia River Steelhead DPS have decreased since the last status review, declining from total (summer and winter run) release of approximately 3 million to 3.5 million from 2008 to 2014. Some populations continue to have relatively high fractions of hatchery-origin spawners, whereas others (e.g., Wind River) have relatively few hatchery origin spawners.

Abundance and Productivity. The Winter-run Western Cascade MPG includes native winter-run steelhead in 14 DIPs from the Cowlitz River to the Washougal River. Abundances have remained low but fairly stable, averaging in the hundreds of fish. Notable exceptions to this were the Clackamas and Sandy River winter-run steelhead populations, that are exhibiting recent rises in NOR abundance and maintaining low levels of hatchery-origin steelhead on the spawning grounds (Jacobsen et al. 2014). In the Summer-run Cascade MPG, there are four summer-run steelhead populations. Absolute abundances have been in the hundreds of fish. Long and short term trends for three DIPs (Kalama, East Fork Lewis and Washougal) are positive; though the 2014 surveys indicate a drop in abundance for all three. The Winter-run Gorge MPG has three DIPs. In both the Lower and Upper Gorge population surveys for winter steelhead are very limited. Abundance levels have been low, but relatively stable, in the Hood River. In recent years, spawners from the integrated hatchery program have constituted the majority of the naturally spawning fish. The Wind River and Hood River are the two DIPs in the Summer-run Gorge MPG. Hood River summer-run steelhead have not been monitored since the last status review in 2016. Adult abundance in the Wind River remains stable, but at a low level (hundreds of fish). The overall status of the MPG is uncertain.

Limiting factors. Limiting factors for this species include (NMFS 2013a):

- Degraded estuarine and nearshore marine habitat
- Degraded freshwater habitat
- Reduced access to spawning and rearing habitat
- Avian and marine mammal predation
- Hatchery-related effects
- An altered flow regime and Columbia River plume
- Reduced access to off-channel rearing habitat in the lower Columbia River
- Reduced productivity resulting from sediment and nutrient-related changes in the estuary
- Juvenile fish wake strandings
- Contaminants

2.2.2 Status of the Critical Habitat

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

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

The action area does not include critical habitat designations for LCR steelhead.

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

Table 1. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Lower Columbia River Chinook salmon	9/02/05 70 FR 52630	Critical habitat encompasses 10 subbasins in Oregon and Washington containing 47 occupied watersheds, as well as the lower Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some, or high potential for improvement. We rated conservation value of HUC5 watersheds as high for 30 watersheds, medium for 13 watersheds, and low for four watersheds.
Lower Columbia River coho salmon	2/24/16 81 FR 9252	Critical habitat encompasses 10 subbasins in Oregon and Washington containing 55 occupied watersheds, as well as the lower Columbia River and estuary rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 34 watersheds, medium for 18 watersheds, and low for three watersheds.

2.3. 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 action area consists of Crooked Creek a waterbody in Wahkiakum County that empties directly into Grays Bay on the Columbia River. It is part of water resource inventory area 25 (Grays – Echoloman). Even though Crooked Creek empties into the Columbia River and not the Grays River, salmonids in Crooked Creek are reasonably likely to be a part of the Grays River populations. However, abundance of populations in Crooked Creek watershed are low, due to the small size of the watershed and degraded conditions. Salmonids that use the action area generally exhibit a stream-maturing life cycle. A stream-type life history is exemplified by juvenile salmon and steelhead that typically rear in upstream tributary habitats for over a year. Salmonids exhibiting this life history include LCR Chinook salmon, LCR steelhead, and LCR coho salmon.

Baseline habitat conditions in the immediate project area are degraded. Crooked Creek is highly channelized in the reach due to the construction of levees and agricultural uses in the area. These measures have led to a loss of floodplain connectivity and side channel habitat throughout the action area. Generally, large woody debris (LWD) concentrations along this portion are non-existent, which can be attributed to poorly functioning riparian areas and upstream forestry practices (Wahkiakum 2017). The baseline condition does not support high abundance of fish, and limits juvenile growth, survival, and ultimately fitness, while they reside in the action area. Salmonids need complex channel features such as riffles, pools, and submerged and overhanging vegetation, to seek shelter, find food, and otherwise survive as they rear and migrate- all of which are lacking in Crooked Creek. Crooked Creek's habitat reduces the overall carrying capacity of that habitat, which means that the number of rearing juveniles that can be optimally supported at this baseline condition is lower than if habitat features were in good condition. Floodplain function and channel migration processes have been identified as the highest restoration needs in the Crooked Creek area (Wahkiakum 2017).

2.4. 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.

Effects of the proposed action are reasonably certain to include the short term effect of increased project-related turbidity on water quality, and the long term effect of continuing inhibition of natural channel processes by placing riprap to maintain the bridge.

2.4.1 Effects on the Critical Habitat

The action area is designated for rearing and migration of listed salmonids.

Physical and Biological Features of freshwater salmonid rearing: sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because without them juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (e.g., predator avoidance, competition) that help ensure their survival.

Physical and Biological Features of freshwater migration: corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. These features are essential to conservation because without them juveniles cannot use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner. Similarly, these features are essential for adults because they allow fish in a nonfeeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores.

Short Term Effect

The short term effect on water quality is related to turbidity generated during the two day work wherein excavation of slumped material and placement of riprap on the bank will occur. There will be intermittent pulses of suspended sediment during the work period that will last for a matter of minutes to hours, periodically during the construction period. The small scale of the project (18 linear feet) and limited duration (2 workdays, daylight hours only) allows the water quality to return background levels, shortly after ceasing work. Water quality is a PBF of rearing and migration habitats for Chinook salmon and coho. This PBF will be slightly diminished, but because the feature will return quickly to the baseline level, we do not anticipate a detriment to the conservation value of this habitat feature or the action area from this adverse effect.

Long Term Effect

Critical habitat for spawning, rearing, and migration does not just consist of discrete locations in rivers, but also the natural processes in rivers that create and maintain healthy conditions that support fish. The projects will not directly affect existing spawning habitat at the work sites, as current degraded conditions likely preclude spawning in the creek bed. The project will also not affect long term water quality or water quantity, as it will not affect the amount of stormwater, the amount of vehicular traffic that could affect the contaminant levels of stormwater, or the capture or treatment of stormwater.

The riprap repairs will, however, have a continued negative effect on habitat creation in the action area by inhibiting natural, channel migration and riparian habitat formation, resulting in long term adverse effects to freshwater habitat through alteration of natural habitat forming processes and ecological connectivity (Cramer 2012; Fischenich 2003). Properly functioning habitat conditions are created and maintained by natural channel movement and interaction with riparian and floodplain areas. The physical processes in streams lead to shifting patterns of micro habitats that provide for various life stages of fish. Habitat formation can be viewed in terms of fluvial/geomorphic processes that lead to micro scale habitat characteristics that salmonids select for rearing. Salmonids need complex channel features such as riffles, pools, and submerged and overhanging vegetation, to seek shelter, forage, and otherwise survive as they make their journey. The continued channelization of Crooked Creek decreases channel movement and precludes riparian habitat creation, thereby interfering with natural habitat forming process and ensuring degraded essential habitat features (Cramer 2012) are persistent within the action area. Although alteration/constraint of natural habitat forming processes negatively affects rearing and migration conditions, and limits carrying capacity of the action area the small-scale footprint of this project is unlikely to severely impair these processes.

2.5.2 Effects on the Species

Effects on species is a function of exposure and response, and is influenced by lifestage at exposure, intensity of effect, and duration or frequency of exposure. The work window is intended to avoid the presence of adults of the three species. Potential adverse effects among smaller juvenile salmonids are more likely because the work will be performed when smaller juveniles could be present in the action area. The project timing intends that work will occur, when water levels are low and water temperature is high, in which juveniles are less likely to be present as juveniles actively avoid high water temperatures when cooler, refuge areas exist.

Short Term Effects

Water Quality/Turbidity - Despite the timing of work to minimize in-water work, and the use of silt fencing if flows are higher than expected, salmonids that enter the stream downstream of the work area during construction could be exposed to low levels of increased turbidity. There will be intermittent pulses of suspended sediment during the work period that will last for a matter of minutes to hours, periodically during the construction period. Newcombe and Jensen (1996) modeled the reported effects of salmonid exposure to different concentrations of suspended sediment for a given time. For example, exposure to 400 mg/L of suspended sediment for 2.7 hours yields minor physiological stress (for example, coughing) and exposure to 400 mg/L for 7.3 hours causes major physiological stress (for example, long term reduction in feeding success). We expect that LCR coho and Chinook salmon will not be exposed to either the intensity of suspended sediments, nor have the duration of exposure, that would result in injury. We expect the level of exposure most likely to occur will result in behavioral responses such as avoidance, or minor responses such as cough.

Fish exclusion - If work area isolation is necessary due to unexpectedly high water volume, any juvenile salmon or steelhead present in the work area will be herded out prior to site isolation, and any remaining fish in the isolated area will be captured and released to flowing water.

Capturing and handling fish causes them stress though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived (NMFS 2002).

Potential adverse effects among smaller juvenile salmonids are more likely because juveniles such as coho, steelhead, and spring chinook have relatively long freshwater residency periods. The work will be performed, however, when smaller juveniles are unlikely to be in the action as timing anticpates that water levels are low and water temperature is high, in which circumstances juvenile fish would have moved to locations with suitably cool water. If fish are present we expect they would be in low numbers.

The number of juvenile salmonids harmed by either the fish exclusion or exposure to turbidity associated with the construction activity, from all three species combined, is likely to be very low.

Long Term Effect

The action area is already modified by existing land use in the area and the bridge abutments that are already in place along this section of stream. The number of juvenile salmonids that use the area is low as a result of the current habitat degradation. The long term effect on salmonids of replacing bank armoring to retain a confined stream section will consist of habitat avoidance in the action area as they seek better habitat conditions elsewhere in the stream. Beamer and Henderson (1998) reported that riprapped streambanks reduced juvenile Chinook salmon abundance. Juveniles were more abundant at natural banks with wood, cobble, boulder, aquatic plants, and/or undercut bank cover compared to hydro-modified banks with riprap and rubble (Beamer and Henderson 1998). The results showed a consistent trend in juvenile fish use across sampled natural and hydro-modified banks, with abundances consistently higher at natural banks (Beamer and Henderson 1998). These studies show that salmonids tend to select natural habitats over hydro-modified banks. Salmonids will still use riprapped banks at low levels, although the habitat provided by these banks is considered degraded, lacking cover and prey. The avoidance behavior may lead to increased energy and stress as juveniles seek out less degraded habitat for foraging and cover in the creek, and may increase competition among fish as they concentrate in adjacent areas of better habitat.

The effect of this proposed project is not a decrease in the carrying capacity of the action area, but rather ensures that the action area will not re-establish conditions that support more fish for the forseeable future. This ensures that Crooked Creek's lack of cover, habitat complexity and connectivity will continue to be diminished for all future cohorts of all three species that use the action area as juveniles and adults. While the project is unlikely to have a measurable effect in terms of decrease at the population level, it will extend the life of the habitat degradation and reduce utilization of by juveniles within cohorts of salmon that use Crooked Creek.

2.5. Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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 2.3). We can reasonably expect that over several decades that the variability of climate conditions could cause more extreme high flow events, episodes of more extreme water quality degradation, warming stream temperatures, and more frequent episodes of very low flows within the action area.

As NMFS has underscored in some critical habitat designations, the quality of aquatic habitat is intrinsically related to the adjacent riparian zones and floodplain, to surrounding wetlands and uplands, and to non-fish-bearing streams above occupied stream reaches. Human activities that occur outside the action area can modify or destroy physical and biological features of the aquatic habitat. In addition, human activities that occur within and adjacent to reaches upstream (e.g., road failures) or downstream (e.g., dams) of designated stream reaches can also have demonstrable effects on physical and biological features of designated reaches (see e.g., 70 FR 52666, Sept 5, 2005).

Wahkiakum County is a rural community with a population of nearly 4000 people over 287 square miles, for a population density of roughly 15 people per square mile. It is unlikely to grow substantially in size in the foreseeable future; the population grew by 154 people in the county between 2000 and 2010 (2010 United States Census). The action area is a small portion of the total county, so it is reasonably expected that growth in the area under consideration is static. It is expected that if new buildings or developments are needed they will be subject to state environmental regulations. NMFS does not believe a significant amount of future state and private activities will occur in the action area that are not subject to federal regulation, although beneficial restoration activities may occur in the crooked creek watershed . Because human population growth rates are low in this county, we expect non-federal development pressures will not aggravate degraded habitat conditions within the action area.

2.6. 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 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), 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.

Each of the three species affected by the proposed action is listed as threatened with extinction, due to low abundance, reduced spatial structure, diminished genetic diversity, and low productivity. The factors for decline include generally the loss of available habitat, and systemically poor habitat quality caused by multiple anthropogenic factors. Factors that limit productivity are in many circumstances the same as the factors for decline.

The baseline conditions in the action area are considered degraded. The bridge repairs incrementally add to the degraded habitat conditions by interrupting habitat forming processes within the small area that the repairs influence. The action area primarily serves as marginal rearing habitat and a migration corridor. The number of salmonids that use the area is anticipated to be low as a result of the current habitat degradation. Other than stochasticity of habitat conditions due to climate change, cumulative effects are anticipated to be very minimal because the human population in the area is growing at a very slow rate. To this context we add the anticipated effects of the proposed action and evaluate the impact on critical habitat and species.

Critical Habitat - The effect of this proposed project is a several day disruption of water quality while work is occurring due to increased turbidity, or if work occurs in the dry, then in the first rainy periods post construction. Water quality is expected to return to its baseline level promply following the construction work, so this disruption of water as a PBF for rearing and migration is not sufficient to reduce the conservation value of the habitat in the action area. The re-armoring of the stream bank to protect the bridge returns the habitat to a condition that will not support cover, resting or refuge for juvenile fish in rearing or migration lifestages. The reduced carrying capacity of the habitat will continue as the bank armoring ensures that successive cohorts of salmonids will experience insufficient habitat conditions to increase survival within the action area. The conservation value of critical habitat in the action area will remain limited for the foreseeable future.

It is impossible to estimate or predict an exact number of individual fish that may be temporarily disturbed or injured by the work from the repairs. Although it is reasonable to conclude that the numbers of individual fish encountered in the action area during construction will be minimal in proportion to the respective populations given the small time and spatial scale of disturbance (small area of increased turbidity and very localized work area), together with in-water work timing, and conservation measures and BMPs. Therefore, the relatively few individuals that are likely to be injured or killed from temporary construction disturbance is too few to cause a measurable effect on the local population abundances, and therefore would have no discernable effect on the larger Grays River populations and on the ESU/DPS level.

Species - Although the construction effects of the action on local fish populations are likely to be very small within the action area and not discernable beyond action area, maintaining degraded habitat into the future limits the carrying capacity. By preventing increases over time in the amount or quality of habitat available, preventing functional access to floodplain habitats, the carrying capacity of rearing habitat for juvenile salmonids is static, and the action area cannot improve growth, development, maturation, and general rates of survival for cohorts of similar size, nor of larger cohorts. Abundance and productivity will remain limited by conditions in the action area, affecting future cohorts of the species. The project will likely not cause further decreases in abundance or productivity, but decrease the likelihood for population improvements over time. Climate change will likely continue to be a factor in recovery of the species, causing continued negative pressure on spawning and rearing particularly from lower summer flows, higher water temperatures, and altered winter precipitation patterns.

2.7. 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 LCR Chinook salmon, LCR coho salmon, LCR steelhead, nor destroy or adversely modify the designated critical habitat for chinook and coho salmon.

2.8. Incidental Take Statement

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

2.8.1 Amount or Extent of Take

In the biological opinion, because species will be present to experience effects of the proposed action, NMFS determined that incidental take is reasonably certain to occur.

Fish will be harmed by one or more of the following: exposure to turbid conditions, exposure to degraded conditions of the stream bank, or by handling. NMFS cannot predict the number of fish that will be directly harmed by the proposed work, because habitat conditions and the presence of fish at the time of work is uncertain as weather may alter the water level and temperatures, which in turn influence fish presence. NMFS' ability to quantify the amount of take in numbers of fish can be difficult if not impossible to accomplish in the case of take in the form of harm, because of the number of fish present at any time is highly variable, and the range of individual fish responses to habitat change is also variable. Some will encounter the habitat conditions along the embankment and merely react by seeking out a different place with better conditions in which to express their present life history. If such a location becomes favored by a relatively large number, competition can occur, causing them to express more energy and suffer more stress.

In these circumstances where enumeration is impossible, NMFS uses the extent of habitat alteration to which present and future generations of fish will be exposed to quantify the extent of take. These measures are readily discernible and present a reliable measure of the extent of take that can be monitored and tracked. NMFS determined that incidental take would occur as follows:

1. Take may occur from exposure to fine sediment and other physical disturbance from the work. The number of fish that will be exposed to adverse effects from the repair work is not one that can be estimated, given the variable presence of fish at any given time. For juvenile fish, the surrogate for take is the sloughed material removed during the 2 day work window (12 cubic yards).

2. Take will occur from long-term habitat degradation associated with the repairs. The take surrogate for adult and juvenile fish is total yardage of riprap placed (not to exceed 10 cubic yards).

3. Take will occur if any fish remain in the isolated work area, that must be netted and moved to flowing water. Based on typical weather conditions during the work window, we expect no more than 10 salmonids would require net-capture and relocation.

2.8.2 Effect of the Take

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

2.8.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). The COE shall:

1. Minimize incidental take from construction activities.

2. Minimize incidental take associated with long term habitat degradation.

3. Minimize the number of fish that will require net-capture and relocation.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the COE or any applicant must comply with them in order to implement the RPMs (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. The following terms and conditions implement reasonable and prudent measure 1:

   a. Sediment Containment. The applicant must ensure that all practicable measures and BMPs are taken to prevent excess sediment from entering the stream from construction-related soil disturbance.
   b. Minimize Impact Area and Duration. The applicant must limit work to the minimum area and duration necessary to complete the project.
   c. Monitor weather forecasts to complete work when least likely to coincide with precipitation events.

2. The following term and condition implements reasonable and prudent measure 2:

   a. Minimize Impact Area. The applicant must confine riprap placement and amount to the minimum amount necessary to complete the project.
   b. To ensure the project was built as proposed, the COE shall require the applicant to submit pictures and/or documentation of the action to NMFS (projectreports.wcr@noaa.gov and Chad.Baumler@noaa.gov),

3. The following terms and conditions implement reasonable and prudent measure 3:

   a. If water levels are higher than expected, conduct herding prior to establishing isolated area, and conduct netting and release prior to dewatering.
   b. If heavy rain is forecast within 72 hours either before or after the work is expected, delay work to allow flows to diminish.
   c. Keep a tally of any fish netted and release, and provide it in a post work report to NMFS, at projectreports.wcr@noaa.gov and Chad.Baumler@noaa.gov.

2.9. Re-initiation of Consultation

This concludes formal consultation for Wahkiakum County Public Works Bridge Erosion 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.

2.10. 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).

Because ongoing future damage to the embankment near the bridge is likely to require continued need for repairs, and because climate change is likely to exacerbate flooding conditions in the future, we recommend that COE utilize its authorities, or partner with the County to assess the long term viability of maintaining the bridge at its current width into the future relative to a replacement bridge with larger span or re-alignment.

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 COE and descriptions of EFH for, Pacific Coast salmon (PFMC 2014); contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The 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 and coho salmon as identified in the Fishery Management Plan for Pacific coast salmon (PFMC 2014).

3.2. Adverse Effects on Essential Fish Habitat

Based on information provided by the COE and the analysis of effects presented in the ESA portion of this document, NMFS concludes that proposed action will have adverse effects on EFH designated for Chinook and coho salmon. These effects include a temporary reduction in water quality from increased suspended sediment, as well impaired habitat forming processes and functions of the bank and riparian area associated with the bank stabilization. These effects are described in more detail in section 2 of this document, above.

3.3. Essential Fish Habitat Conservation Recommendations

1. Minimize water quality impacts from construction activities, the COE should:

    a. Sediment Containment. The applicant must ensure that all practicable measures and BMPs are taken to prevent excess sediment from entering the stream from construction-related soil disturbance.
    b. Minimize Impact Area and Duration. The applicant must limit work to the minimum area and duration necessary to complete the project.
    c. Monitor weather forecast to complete work when least likely to coincide with precipitation events.

2. Minimize long term habitat degradation to stream bank and riparian conditions, the COE should:

    a. Minimize Impact Area. The applicant must confine riprap placement and amount to the minimum amount necessary to complete the project.

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, COE 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 COE 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 COE. Other interested users could include Wahkiakum County Individual copies of this opinion were provided to the COE. This opinion will be posted on the Public Consultation Tracking System website https://eco.fisheries.noaa.gov/suite/sites/eco). 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 and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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