https://doi.org/10.25923/1zmh-4f62

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 Consultation No.:
WCRO-2019-01137

December 4, 2019

Daniel Mathis
Federal Highways Administration
Suite 501 Evergreen Plaza
711 South Capitol Way
Olympia, Washington 98501 1284

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the 10th Avenue Street Improvements, Clark County, Washington (HUC 170900120401)

Dear Mr. Mathis:

Thank you for your letter of June 17, 2019, 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 10th Avenue Street Improvements in Clark County, Washington. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

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 for improving 10th Avenue Street between NE 149th and NE 154th Streets. 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: Liana Liu, FHWA

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

NE 10th to NE 149th Street Improvements

NMFS Consultation Number: WCRO-2019-01137

Action Agency: Federal Highways Administration

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 Chinook salmon (*Oncorhynchus tshawytscha*)	Threatened	Yes	No	No	No
Columbia River chum salmon (*O. keta*)	Threatened	No	No	No	No
Lower Columbia River coho salmon (*O. kisutch*)	Threatened	Yes	No	Yes	No
Lower Columbia River steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No	No

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

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

Issued By:

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

Date: December 4, 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, as amended.

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 Office, Lacey, Washington.

1.2 Consultation History

On June 17, 2019, NMFS received a letter from the Federal Highway Administration (FHWA) requesting initiation of a formal consultation for a project to make safety improvements and increase fish passage at 10th Avenue between NE 149th and NE 154th Streets. NMFS determined the consultation package was complete and initiated consultation on July 15, 2019.

In its request for consultation, the FHWA determined that the project is not likely to adversely affect Columbia River chum or Lower Columbia River (LCR) Chinook salmon, nor adversely modify proposed critical habitat for LCR coho salmon. We concur with the FHWA's "Not Likely" determination on Columbia River chum, and the analysis supporting that determination is found at Section 2.11 of this document. We disagreed with the FHWA's effects determination on LCR Chinook Salmon, and on critical habitat for LCR coho salmon.

The FHWA determined that the project is likely to adversely affect Lower Columbia River coho salmon and steelhead, and may adversely affect essential fish habitat (EFH) for Pacific salmon. We agreed with the FHWA effects determination for LCR coho and steelhead.

Accordingly, NMFS determined that the project is likely to adversely affect Lower Columbia River coho, steelhead, and Chinook salmon, as well as critical habitat designated or proposed for LCR coho.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on October 28, 2019. This consultation was pending at that time, and we are applying the updated regulations to the consultation. As the preamble to the final rule adopting the regulations noted, "[t]his final rule does not lower or raise the bar on section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and, consistency, streamlines consultations, and codifies existing practice." We have reviewed the information and analyses relied upon to complete this biological opinion in light of the updated regulations and conclude the opinion is fully consistent with the updated regulations.

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). Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The action will include the following components:

- Street improvements of NE 10th Avenue (widening both travel lanes; adding a center turn lane, bicycle lands, retaining walls, and sidewalks);
- An approximately 0.3-mile-long section of NE 10th Avenue roadway would be improved to include two 11-foot-wide travel lanes and a 12-foot-wide center left-turn lane.
- Six-foot-wide bike lanes and sidewalks plus six-inch-wide curbs, as well as gutters, would be installed throughout the length of the project on NE 10th Avenue.
- Replace a 30 inch diameter culvert with a stream simulation 17 foot diameter culvert, conveying the Unnamed Tributary under NE 10th Avenue would be installed to conform with Washington and Federal fish passage guidelines;
- Stormwater facilities, including outfalls, wetland detention pond, and riprap for diffusing stormwater discharges;
- Stream habitat restoration and riparian plantings; and
- Utilities extension and relocation.

The project also incorporates measures to avoid or reduce effects to listed species and habitat:

- An in-water work window from July 15 to November 1 to ensure the lowest numbers of fish presence and to enable work to be completed below ordinary high water (OHW) in one work window;
- De-watering and isolation of the work area;
- Exclusion activities to remove any present fish prior to in-water work; to include herding, netting, and if necessary, electroshocking, in that order
- Isolation of in-water work areas;
- Construction of the outfall to the Unnamed Tributary would be performed outside of the wet season when soil in this area would contain less moisture and access to this area would cause the least amount of disturbance.
- Sediment control measures and pumping of sediment laden water to upland discharge to minimize introducing sediment to streams.
- During construction water quality will be regularly inspected for turbidity and pH impacts.

The FHWA asserts that there are no related activities, nor indirect effects in the form of induced urban expansion associated with the proposed action. While the project is within the urban growth boundary for the City of Vancouver, existing roads are providing appropriate level of service to meet current traffic patterns, as well as projected traffic patterns to the year 2035. 10th Avenue is anticipated to serve primarily as a second access route to the Clark County Event Center, which is identified in emergency planning documents as a primary logistics staging area.

1.4 Action Area

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

The action area is determined by the greatest extent of physical, chemical and biological effects stemming from the project. For the proposed action, there are both short-term construction-related effects and long-term structure-related effects. The greatest extent of physical, chemical or biological effects stemming from the proposed action is associated with likely impacts of permanent water quality effects due to the discharge of stormwater. Because no method of treatment other than full infiltration will fully remove all contaminants, stormwater discharges will be a chronic source of episodic chemical load into the salmonid bearing waterbody. While the State of Washington's water quality regulations assumes the additional load becomes indistinguishable from the background level at the end of the mixing zone, downstream approximately 200 yards from the discharge point, it is certain that the additional load of contaminants will be transported down the unnamed tributary and Whipple Creek to the confluence with Lake River.

Therefore for this consultation, the action area consists of the 0.8 mile unnamed tributary to Whipple Creek, plus all areas of Whipple Creek downstream from the confluence of the unnamed tributary, to Lake River. This is the area where effects of action will influence the conditions in the environment. Whipple Creek supports critical habitat for LCR coho salmon only. The action area is designated EFH for Chinook salmon and coho salmon (PFMC 2015). The effects to EFH are analyzed in the MSA portion of the document.

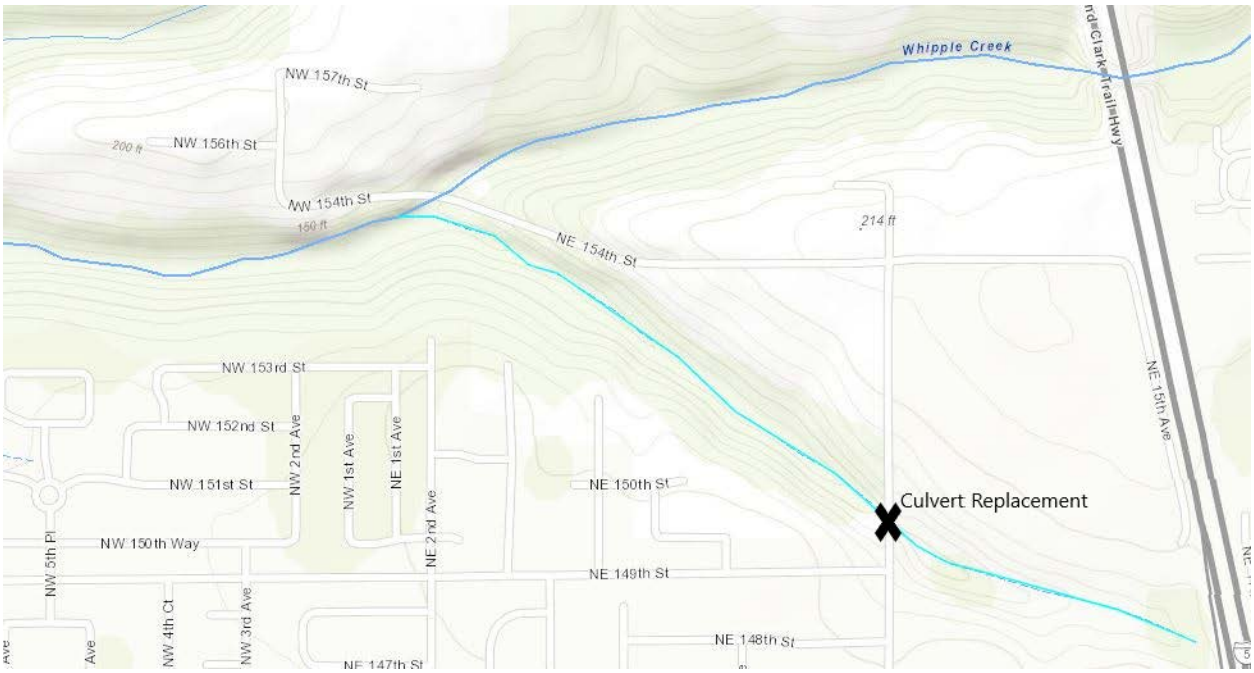

Figure 1. Unnamed Tributary and the Confluence with Whipple Creek

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 provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes 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 an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR402.02). 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 as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 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 destroy or adversely modify 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.
- 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 Rangewide Status of the Critical Habitat and Species

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 et al. 2014, Mote et al. 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Tague et al. 2013, 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). 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).

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 foodwebs (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 and 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 expected to be 1.0-3.7^{o}C higher 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. Acidification also impacts 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 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 demographically independent populations (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.

Spatial Structure and Diversity. 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).

Abundance and Productivity. 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).

[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 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" 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).

In the action area, the small unnamed tributary starts near the western edge of Interstate Highway 5, passes through the partial fish barrier culvert under 10th avenue and continues to the confluence with Whipple Creek. The tributary is approximately 0.8 miles long and 0.3 miles are partially blocked to species due to the culvert. The tributary lies within a small canyon in a forested riparian zone that has an average width of approximately 60 to 100 feet. The unnamed tributary is not documented to have fish presence, but Whipple Creek is known to support salmonids and it is reasonably certain that they are present in the tributary.

The Whipple Creek watershed, within and outside the action area, suffers from channel instability, erosion, lacks woody debris, and is disconnected from its floodplain, the basis for an overall rating of poor condition, according to a watershed report (Clark County 2010). Whipple Creek has documented concerns for high temperatures, and a low biotic index. A portion of Whipple Creek lies within a 375 acre regional park, where conditions are better with riparian vegetation largely intact, but trail use within the park is a source of sediment load. Restoration efforts within the park to improve the trails are being undertaken. The remainder of the Creek flows through areas that have been converted to suburban uses. A Clark County web page from 2012 indicates a restoration plan included stabilizing the stream with rock and large wood, planting native riparian vegetation, installing large wood, and restoring 5 acres of adjacent wetland and floodplain. Whipple Creek is fed by the unnamed tributary, and is itself a tributary to Lake River.

Lake River supports LCR chum, coho, fall Chinook, and winter steelhead, and the populations are designated as stabilizing, meaning management decisions should strive to maintain their current level of abundance. Lake River is in poor condition, with systemic degradation of floodplain and off channel habitats, poor stream bank conditions, and impaired water quality (LCFRB 2013).

NMFS consulted on a bridge replacement and street improvements similar to the proposed project that also took place on Whipple Creek in 2016. Take from the 2016 consultation was identified for both short-term construction impacts (worksite isolation, fish capture and handling, and turbidity), long-term impacts (water quality from stormwater discharge) and mid-term impacts (riparian vegetation removal). Beneficial effects from that project included improved fish passage on Whipple Creek upstream of the action area.

Species and Recovery Plans

The action area falls within the LCR planning unit and is described in the LCR recovery plan (NMFS 2013). That plan identifies increased surface runoff from urban and rural development as a factor that has diminished overall tributary habitat productivity, and calls for recovery actions based on better stormwater management to reduce contaminants in streams. Reducing exposure to contaminants commonly found in stormwater is also cited as an important part of the recovery strategy for estuarine habitats, where exposure to toxic contaminants is cited as a secondary limiting factor for juveniles in all populations. While exposure of those life stages to contaminants in the water column of the lower Columbia River and estuary is important, contaminants in the sediment and in the food web are likely to be even more significant as diet is probably a more important route for exposure to contaminants than the water column (Fresh et al. 2005, NMFS 2011d).

The LCR coho salmon, Chinook salmon, and steelhead populations that rely on Whipple Creek will be exposed to the effects of the project, with the highest intensity and frequency near the stormwater discharge site. These populations are Salmon Creek Coho, Salmon Creek Steelhead, and Salmon Creek fall Chinook salmon. The LCFRB (2010) has designated the Salmon Creek population of each species as stabilizing for recovery. Salmon Creek Chinook salmon reside predominantly in the lower 5 miles of Whipple Creek, Salmon Creek coho and steelhead are likely to be found throughout the action area.

Little current abundance data for Salmon Creek coho exists, but returns are presumed to be very low. Historical population estimates range from 6,000-35,000 combined early and late stock adults. The current Salmon Creek coho stock is of mixed origin with composite production (Washington Department of Fisheries (WDF) et al. 1993; Washington Department of Fish and Wildlife (WDFW) 2002), and is listed as depressed in Washington State's 1992 Salmon and Steelhead Stock Inventory (SASSI) report (WDF et al. 1993) and unknown in the 2002 Salmonid Stock Inventory (SaSI) report (LCFRB 2010; WDFW 2002), primarily because of chronically low escapement and production.

Winter steelhead adults return to Salmon Creek from December through April. Spawning generally occurs from early March to early June (LCFRB 2010).The LCFRB (2010) has designated the Salmon Creek population of LCR steelhead as stabilizing for recovery. Historical population estimates in Salmon Creek range from 500 to 8,000 adults. Current natural spawning returns are less than 50 fish.

The Salmon Creek population of fall Chinook Salmon reside Salmon Creek and in the lower 5 miles of Whipple Creek. Historical adult abundance of the population is 100 – 400 fish, but current estimates of natural spawners is fewer than 100. Spawning time peaks in October. Juvenile rearing occurs near and downstream of the spawning areas. Juveniles migrate from Salmon Creek in the spring and early summer of their first year.

2.4 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. 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).

After the application of all minimization and conservation measures described in Section 1.0 of this document, the proposed action would still have some adverse effects that cannot be avoided, which we analyze here. Likely effects from the proposed action are associated with short-term construction impacts, and long-term impacts of the proposed structural changes.

The temporary effects associated with construction that are reasonably certain to occur include: 1) localized water quality reduction from elevated levels of turbidity, 2) Fish handling/exclusion activities and 3) riparian zone and channel modification.

The long-term effects of the project are: 1) degraded water quality from the increase in impervious surface and the associated stormwater, and 2) permanent, improved fish passage. These proposed activities will have effects on habitat conditions as described in the following paragraphs.

2.4.1 Effects on Habitat

The FHWA's proposal to fund the 10th Avenue road improvements will cause both short term and permanent effects to proposed critical habitat for LCR coho salmon. Some effects will be negative and others positive. We look to the conservation ranking of the adjacent Salmon Creek watershed, in order to estimate the conservation value that Whipple Creek may have for LCR coho salmon. The conservation ranking of critical habitat in Salmon Creek is "Medium," for LCR coho. Given that LCR coho life history includes a longer freshwater residency, a medium ranking provides important value for the conservation of the species, but is not of the highest value. Because the improved fish passage is part of the action, the conservation value of the proposed LCR coho salmon critical habitat is likely to be maintained by the project, even though some project effects on features of critical habitat are negative.

Channel Modification near or below Ordinary High Water Mark (OHWM)
Work near and below the OHWM is likely to cause a temporary increase in suspended sediment and turbid conditions in the unnamed tributary. This is a localized impact to water quality conditions, but ephemeral, and likely to persist only during in-water work and for a period of hours, up to a few days, post construction.

Bank hardening with riprap will degrade habitat conditions along the streambank edge, and preclude reestablishment of native riparian vegetation. Bank armoring with rip-rap coupled with a lack of tree cover is likely to increase stream temperatures, and decrease the available prey

base because riparian vegetation will not be present to create overwater shade, and the rip-rap will largely prevent benthic invertebrates from colonizing streambed habitat. These adverse effects are reasonably certain to last for moderate duration until replanted riparian vegetation matures and slowly ameliorate the degraded habitat conditions at this project location over a period of years.

In one location of the unnamed tributary stormwater will be discharged onto planned diffuser rock, which will require removing good quality vegetation (abundant, diverse vegetation including shrubs and small trees within the channel and on the banks), and which will cause greater thermal input at the headwater of the tributary. This tributary is not identified as supporting fish, but it does flow directly to Whipple Creek which is known to support salmonids. Whipple Creek is identified as having increased stream temperatures and low biotic index.

Impervious Surface/Stormwater
Although the amount of impervious surface and stormwater discharge from the proposed project is relatively small, the proposed project will incrementally increase pollutant levels by adding a new source of contaminant load. Despite the use of best available practices, treatment will not capture all stormwater pollutants, meaning that discharges of road-derived contaminants are reasonably certain to occur in perpetuity. The dilution modeling conducted for regulatory compliance does mean that at a certain distance from the discharge point, it becomes impossible to discern the additional level of pollutant from the background level. However, this does not mean that the receiving water bodies or downstream waters are not impaired by this additional source of contaminants, but rather that the additional load cannot be meaningfully measured.

Vegetation Removal
The project will remove 34 trees of varying size and additional riparian vegetation which will impair critical habitat functions in the unnamed tributary. The tree and riparian vegetation removal is reasonably certain to reduce: (1) aquatic macroinvertebrate salmonid prey (that otherwise would forage on the riparian-derived detritus); (2) overwater shade (that otherwise would buffer elevated temperatures during summer); and (3) large woody debris recruitment into the creek (that otherwise provides refugia, creates pools, and also supports a detritus food base). The duration of these adverse effects will persist for decades, improving incrementally as tree canopy slowly re-establishes.

Fish Passage and Riparian Improvement
Long-term beneficial effects of culvert replacement include restoration of fish passage and restoration of natural stream channel processes through removal of the channel constricting culvert. The larger culvert allows natural stream hydrologic functions and improved sediment transport. The native shrubs and trees included in the planting plan will provide a number of important riparian functions. The native shrubs and trees in particular will provide shade, floodplain roughness, bank stabilization, and instream cover. The diversity of vegetation included in the plan will also increase beneficial organic matter inputs and habitat complexity.

2.4.2 Effects on Physical and Biological Features of Critical Habitat

These habitat alterations must be further evaluated in terms of how they affect the Physical and Biological Features (PBFs) of the critical habitat for the listed species. Substrate, water quality, and floodplain connectivity are factors limiting the recovery of all Pacific salmon considered in this opinion. Within the designated and proposed critical habitat of the action area, are spawning, rearing, and freshwater migration areas. Good water quality is a PBF of all three habitat types. Substrate is a PBF of freshwater spawning and rearing habitats. Floodplain connectivity is a PBF for freshwater rearing habitats.

1. ***Freshwater Spawning Sites.*** There are suitable spawning sites in the action area, but these are several miles downstream of the project site. Due to this distance, the water quality PBF is the only element that will be affected. The chronic incremental addition of stormwater is likely to be sufficiently diluted as to be indistinguishable from the background or baseline levels, and the effect on spawning is likely to be identifiable only as an overall constraint in the potential for water quality to be improved/ support better egg survival, as identified in the recovery plan.

2. ***Freshwater Rearing and Migration.*** This component of LCR coho salmon critical habitat will be affected as described below:
    a. *Floodplain connectivity (rearing PBF only).* Will be improved, though with moderate duration impairment of vegetation features of the floodplain habitat. Vegetation features on the floodplain will ameliorate over time as plantings become established and mature.
    b. Forage (*a PBF of both rearing and migration habitats*). Pollutants in stormwater runoff from the proposed project into the receiving waters will add to, and compound with, other pollutants already present there in ways that adversely affect the amount of food available for juvenile Pacific salmon by injuring or killing their prey, thus reducing the amount of energy available for young salmon to meet the physiological demands of rearing and migration. Similarly, the differential impact of stormwater runoff on prey species is likely to change their relative abundance and their community composition, thus further altering the foraging efficiency of juvenile fishes. Consumption of contaminants ingested inside the bodies of prey, or with plankton, detritus or sediment that is also ingested while feeding, provides a major pathway into the body of Pacific salmon where they are likely to adversely affect juvenile fish growth and development, suppress their immune systems, and impair sensory functions thereby reducing their survival. Detrital prey base will also decrease when trees are removed from the project site, though replanting will allow this condition to improve over time.
    c. *Natural cover (a PBF of both rearing and migration habitats).* The addition of the diffuser structure and rock will permanently alter bank habitat conditions in a manner that decreases the capacity to support juvenile rearing fish. The rock armor adjacent to the water reduces bank complexity that can form juvenile refugia, and adverse effects are likely to occur, albeit in a small area.
    d. *Water quality (a PBF of both rearing and migration habitats).* Will be episodically impaired for the life of the project by pollutant loading, as described above. Rock

armor near the OHWM is a source of thermal input to the stream water, as the rocks absorb, retain, and radiate heat from the sun.

e. *Free of artificial obstruction (a PBF of migration habitats only).* No detrimental effects are likely to occur. Benefits to passage are likely.

In summary, the effects of the proposed action are likely to have an adverse impact on several PBF conditions that listed salmon need for forage and water quality at sites used for freshwater rearing and migration areas. Those adverse impacts will add to the baseline conditions of the proposed CH in the action area. However, the project's adverse impacts on the proposed PBFs are located in an area where the populations that will be affected are not priority populations for recovering the ESU, and the watershed is ranked as having "Medium" conservation value. Additionally, the project has a component that is beneficial, which is the increase in accessibility to more habitat with an improved culvert. Taken together, the caliber, area of, and duration of adverse effects on PBFs from this project is not expected to appreciably impair conservation value of the watershed.

The effects of modified habitat conditions will have corollary effects on listed fish, described in further detail in Section 2.4.3.

2.4.3 Effects on Listed Species

Effects to species include both direct effects and indirect habitat effects. Direct effects will occur when fish are purposely herded, trapped, handled, captured, and released, even though these activities are used to prevent the fish from being exposed to the negative consequences of work near or below the water line. Listed fish exposed to direct and indirect habitat modifications, which are described above, will experience a variety of responses. The number of fish that exhibit particular responses, however is difficult to estimate with any precision, because the different cohorts over time will be of different sizes, because fish are highly mobile and thus may experience different intensity or duration of exposure, and because the composition of fish presence is also variable over time.

Fish handling/exclusion activities. Actions taken to exclude fish from the worksites are intended to reduce the number of fish that will be potentially exposed to detrimental habitat conditions that occur during the construction near or below the ordinary high water mark. Removing fish from the work area reduces exposure to sound, disturbance, suspended sediment and sedimentation, and dewatering/stranding. Fish exclusion is sequenced - first nets are used to "herd" fish from the area, then the area is isolated with structures that will exclude fish from re-entry. Fish that are observed in the isolated are netted and released to flowing water outside of the isolation area. To find and capture any unobserved or otherwise uncaptured fish, electroshocking may be conducted. Each of these techniques will create stress in each of the individual fish, but which will abate within hours – the least amount of stress will occur with "herding." Netting and handling to release fish will add risk of injury among the handled individuals. If electroshocking is employed, the risk of injury increases and adds a likelihood of mortality in a small percentage of fish (roughly 5 percent) (Snyder 2003).

Response to work near or below Ordinary High Water Mark (OHWM). Any fish not excluded or moved from areas of in-water work will die from de-watering, or by being smothered/crushed during the placement of fill or rock armoring. Adjacent to these work areas, despite employing best management practices to reduce suspended sediments in water, it is likely that some sediment will reach moving water and create a turbidity plume that fish will encounter. So long as a portion of the stream remains clear of sediment, juvenile fish are likely to relocate to these areas, thus avoiding injury to their gills/respiratory system that has the potential to occur with prolonged exposure to high suspended sediment loads (Newcombe and Jensen 1996). This may increase competition for holding and feeding resources for the duration of the turbid condition, but water clarity will ameliorate rapidly after work ceases, allowing fish back into all habitat areas within hours to several days, depending on stream volumes.

If fish are unable to fully avoid areas with increased suspended sediment, likely responses include "cough," gill abrasion, and raised cortisol levels. These responses are temporary. Fish may also experience behavioral responses that range from more feeding success when benthic prey are suspended with the sediment, to reduced forage success as these prey may be harder to detect (Utne-Palm 2002).

The addition of rock within the stream will alter habitat conditions in a manner that decreases conditions of rearing juvenile fish by warming the water and by decreasing the amount of plant and soil that can capture pollutants, (Schmetterling et al 2001) until adjacent planting shades the rock armor. Until then, the rock pad that serves as a dispersant for water discharged through the outfall, is a source of thermal input, as the rocks absorb, retain, and radiate heat from the sun. This, combined with an absence of tree cover/shade in the areas disturbed to carry forward the project, is likely to slightly warm the stream, which in certain circumstances can become too warm to support rearing juveniles (which are dependent on cool water, especially in summer and autumn months). Rocked stream areas and lack of riparian tree cover also each independently reduce sources of prey: the armor impairs prey types found in soils and sediments, and the lack of riparian trees reduces detrital insects as a prey source. Both conditions decrease the amount of food, and consequently competition increases among the rearing fish. Because the project includes riparian plantings near where the outfall discharges to the unnamed tributary, the amount of habitat impact caused by the rock will reduce over a period of years as the plantings become mature.

Response to stormwater exposure. After treatment, stormwater runoff from the development flows from the tributary to Whipple Creek and into Lake River and from there into the Columbia River. However, the pollutant load will be indiscernible from the baseline condition of the receiving water body from Salmon Creek, and beyond into the Columbia River. Because the discharge will include a complex load of organic and inorganic contaminants, into water bodies that are already affected by contaminants, the incremental addition of even small amounts of these pollutants are a source of potential adverse effects to salmon and steelhead, even when the "new" source load cannot be distinguished from ambient levels (Hecht et al. 2007; Laetz et al. 2009; Macneale et al. 2010; Sandahl et al. 2007; Spromberg and Meador 2006).

Some contaminants also accumulate in both the prey of and tissues of juvenile salmon where, depending on the level of exposure, they cause a variety of lethal and sublethal effects on salmon

and steelhead, including disrupted behavior, reduced olfactory function, immune suppression, reduced growth, disrupted smoltification, hormone disruption, disrupted reproduction, cellular damage, and physical and developmental abnormalities (Fresh et al. 2005; Hecht et al. 2007; Lower Columbia River Estuary Partnership 2007). Even at very low levels, chronic exposures to those contaminants can have a wide range of adverse effects on the ESA-listed species considered in this opinion (Carls et al. 2008; Comeleo et al. 1996; Feist et al. 2011; Hecht et al. 2007; Sandahl et al. 2007; Spromberg and Meador 2006).

Dissolved copper is the constituent of greatest concern, due to the increase from current conditions. Sub-lethal concentrations of dissolved copper have been shown to impair olfactory function in salmon in freshwater (Tierney et al. 2010). Baldwin et al. (2003) found that 30- to 60-minute exposures to a dissolved copper concentration of 2.3 μg/L over background levels caused olfactory inhibition in coho salmon juveniles. Sandahl et al. (2007) found that a 3-hour exposure to a dissolved copper concentration of 2.0 μg/L caused olfactory inhibition in coho salmon juveniles. A significant reduction (29.2 percent) of olfactory function has been modeled at levels as low as 0.79 μg/L above background levels (Hecht et al. 2007). That copper-induced loss of smell leads to a reduction in predator avoidance (McIntyre et al. 2008). Further, fish have shown avoidance of sub-lethal levels of dissolved copper in fresh water (Giattina et al. 1982).

While discharge from the project cannot be specifically associated with adverse effects of specific individuals from the species considered in this opinion, these contaminants have been shown to injure or kill individual fish either by themselves or through additive, interactive, and synergistic interactions with other contaminants (Baldwin et al. 2009; Hicken et al. 2011; Laetz et al. 2009; Spromberg and Meador 2006; Spromberg and Scholz 2011) at ambient levels already present in the Columbia River and its estuary (Fuhrer et al. 1996; Johnson et al. 2013; Morace 2012; ODEQ 2012). Thus, the contribution of these contaminants from the project, while small, will be an additive increment of detriment in the already degraded aquatic habitat of these species. Thus, the effects of this action on the ESA-listed species considered in this opinion include the presumption of additional exposure to contaminants present in the discharge of stormwater, and potential synergistic effects as these contaminants interact with other compounds already present in the receiving water bodies.

Response to improved passage and riparian. Juvenile fish that have increased access to the upper portion of the tributary and associated floodplains, may have access to more prey, and experience increased growth and fitness (Jeffres 2008) so long as they can follow receding water back to the river without being trapped or stranded (Sommer 2005). The area to be redesigned currently lack good quality vegetation, and predominantly supports reed-canary grass. Clark County's proposal, however, includes significant levels of native vegetation replanting. Because this project will re-establish habitat complexity, adjacent to the tributary, where juvenile salmonids are suspected to rear, and because timing of the work will largely avoid contributing sediment into the water, this aspect of the proposal has only positive effects for rearing juveniles.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

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

The population of Clark County grew an estimated 13 percent from 2008 to 2018, from 424,200 to 479,500 (Washington State Office of Financial Management 2019a). The population of Clark County is expected to grow from the 2018 estimate of 479,500 to an estimated 579,768 (medium projection) by 2030 (Washington State Office of Financial Management 2019b), which is an approximately 21 percent increase. It is likely that development activities in the action area, watershed, and County would continue in the future under existing zoning regulations, increasing as population density rises. Intensifying land use is accompanied by increased stormwater runoff which, despite use of best treatment practices, carries with it a variety of pollutants that degrade water quality conditions. We can reasonably anticipate that the cumulative effects of these non-federal actions will cause persistent and incremental degradation in Whipple Creek and its unnamed tributary, downstream to the confluence with Lake River. LCR coho and steelhead, with their longer freshwater residency periods, will have longer exposure to these persistent, low level stormwater effects, and thus are more likely than LCR Chinook to experience latent effects from exposure such as reduced predator avoidance abilities.

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 diminish the value of designated critical habitat as a whole for the conservation of the species.

The three species of ESA-listed fish that are likely to be adversely affected by this proposed action are listed as threatened. Each species is affected by many of the same listing factors, and limiting factors. These include loss of habitat (e.g., access to spawning areas, off channel and side channel habitat), degraded habitat (e.g., water quality impaired by temperature, sediment, and pollutants; riparian and bank conditions impaired by shoreline armoring and lack of

vegetation); as well as residual effects from over-utilization. Within the action area, baseline conditions are consistent with these systemic habitat factors.

The effects of the proposed action, when added to the environmental baseline, includes both positive and negative, permanent and ephemeral effects, as described above. The most significant cumulative effect anticipated from the continued conversion of land and intensifying development is stormwater-associated pollutant load. Given that state and federal laws regulate point and nonpoint discharges, we anticipate that stormwater will be captured and treated, limiting the amount to low levels of pollutants that intermittently enter the stream. Thus, the effects of the proposed action, considered with cumulative effects, when added to the baseline, are likely to be incrementally negative, but are not likely to reach a level that will appreciably reduce the abundance, productivity, spatial structure, or genetic diversity of the populations considered in this opinion.

Similarly, the action area is designated as critical habitat for LCR coho, and contains freshwater rearing, freshwater migration habitat for salmonids. The conditions of the habitat in the HUC, and the relative importance of the populations in the HUC, lead to a designation of moderate conservation value. When we consider the effects of the action, and cumulative effects, on the PBFs in the action area, we cannot conclude that there will be appreciable, detrimental change in the conservation value of the habitat. Overall, the effects of the proposed action, when added to the environmental baseline, and considered with cumulative effects, and the status of critical habitat, will reduce the condition and function of PBFs in the action area but the effects of the project themselves are insufficient to appreciably impair the ability of any of the affected critical habitat units to serve their intended conservation roles. Thus, the affected critical habitat will retain its ability to provide conservation value for the LCR coho considered in this opinion.

2.8 Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed project, any indirect effects, and cumulative effects, it is NMFS' biological opinion that the proposed project is not likely to jeopardize the continued existence of LCR Chinook salmon, CR chum salmon, or LCR coho salmon, nor result in the destruction or adverse modification of any designated critical habitat.

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 incidental take statement.

2.8.1 Amount or Extent of Take

As described in detail above, the proposed project will impair stream bed and bank conditions, reduce riparian vegetation, and degrade water quality by increasing temperature and stormwater pollutants into aquatic habitats at times when those habitats are occupied by the ESA-listed species considered in this opinion, which is likely to injure or harm individuals of the listed species.

Take in the form of harm caused by degraded water quality conditions is expected to occur among all individual fish from all three ESUs, from the point at which the stormwater enters the unnamed tributary and extending downstream to the point that it reaches Lake River. This take cannot be quantified as a number of fish to be harmed, due to the episodic character of stormwater release, the various age classes of fish that may be exposed, and the variable numbers of fish that may be present during stormwater discharges, over the life of the project. For this reason we identify a surrogate measure for take, which in this case is the downstream point at which discharge is modeled to no longer exceed the biological thresholds under either the baseline model or the post project model.

The furthest downstream point at which the model effectively measures the exceedance of the biological threshold is approximately 1,000 feet from the point of discharge.

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).

1. Minimize incidental take from construction activities.

2. Minimize incidental take associated with long-term habitat degradation due to stormwater.

2.8.4 Terms and Conditions

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

incidental take statement (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. Minimize the disturbed footprint, and retain as much existing native vegetation as possible in the unnamed tributary as a method to ensure biotic index and temperature are not degraded.

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

    a. Minimize the amount of stormwater by limiting new impervious surface to the 1.4 acres described in the biological assessment.
    b. Ensure the detention pond was built as proposed, according to the parameters described in the consultation initiation information, as recorded in their proposed permit, and as relied-on by NMFS while conducting this consultation. The FHWA shall require the applicant to submit pictures and/or documentation of the action to NMFS (projectreports.wcr@noaa.gov and Chad.Baumler@noaa.gov).
    Each annual report must be submitted to NMFS, at projectreports.wcr@noaa.gov and Chad.Baumler@noaa.gov.

2.9 Conservation Recommendations

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

FHWA should evaluate and identify appropriate applications for pervious pavement and develop guidance for use of pervious pavement, e.g. in low traffic use road expansion, such as addition of bicycle lanes and road shoulders.

When and where possible FHWA should infiltrate stormwater using proven BMPs and monitor receiving waters for stormwater-derived contaminants such as dissolved copper and zinc to evaluate efficacy of BMPs.

2.10 Reinitiation of Consultation

This concludes formal consultation for the 10th Avenue construction 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 incidental take statement 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 to 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.

In particular, failure to provide timely reporting may constitute a modification of the proposed action that has an effect to listed species or critical habitat that was not considered in the biological opinion and thus may also require reinitiation of this consultation.

To reinitiate consultation, contact Chad Baumler of NMFS at Chad.Baumler@noaa.gov, or by phone at (360)753-4126, and refer to NMFS No.: WCRO-2019-01137.

2.11 "Not Likely to Adversely Affect" Determinations

The FHWA determined that the project is not likely to adversely affect Columbia River Chum salmon, and NMFS concurred with that determination for the following reasons. Chum salmon use of Whipple Creek historically occurred in the lowest reaches of Whipple Creek. Current abundance of the Salmon Creek population of chum, which is inclusive of Whipple, Salmon Gee, Burnt Bridge and Cedar Creeks, is estimated at fewer than 100 natural adult spawners, and rearing periods are brief, with outmigration to the Columbia River in early spring. Given the low likelihood of presence in Whipple Creek, and the fact that water quality effects from the project are likely to be attenuated by the time they reach this portion of the river, to a level at which the additional increment of exposure is impossible to discern, we agree that neither exposure or response is likely to occur among the fish that are present. The chance of exposure of chum salmon to the effects of this action is therefore discountable. Columbia River chum do not have critical habitat in the action area.

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

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 on descriptions of EFH for Pacific coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Pacific coast salmon (PFMC 2015) contained in the fishery

management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The Pacific Fishery Management Council (PFMC) described and identified EFH for groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), and Chinook salmon, coho salmon, and Puget Sound pink salmon (PFMC 2015). 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. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, NMFS concludes that proposed action will degrade water quality and riparian conditions causing adverse effects on EFH designated for Pacific Coast salmon.

3.2 Adverse Effects on Essential Fish Habitat

As part of the information developed during this consultation, NMFS determined that the action, as proposed, will adversely affect EFH designated for Chinook and coho salmon. The project will discharge stormwater runoff that contains PAHs, dissolved and suspended metals, and other persistent contaminants of concern into Whipple Creek which drains to Lake River which eventually drains the Columbia River. Contaminants that are dissolved or in suspension, while still present in the water, will be indiscernible from background levels by the time the water reaches the Lake River. These contaminants will affect water, sediment, and the prey base, within freshwater habitat areas. Removal of riparian vegetation in order to place rock on the slope to dissipate erosive energy of the stormwater discharge will decrease detrital prey base, and increase thermal inputs within stream habitat.

3.3 Essential Fish Habitat Conservation Recommendations

Because the properties of EFH that are necessary for the spawning, breeding, feeding or growth to maturity of managed species in the action area are the same or similar to the biological requirements of ESA-listed species as analyzed above, and because that analysis has determined that there are adverse effects to several elements of habitat, NMFS has provided two conservation recommendations.

The following two conservation recommendations are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These conservation recommendations are a subset of the ESA reasonable and prudent measures:

1) FHWA should minimize the footprint of the disturbed area and vegetation on the bank of the unnamed tributary as a method to ensure biotic index and temperature are not degraded.
2) FHWA should provide annual photo documentation of plantings provide to meet term and condition 1, above, for a period of three years following the completion of the project to show planting survival.

Fully implementing these EFH conservation recommendations would protect, by minimizing the adverse effects described in Section 3.2, above, in approximately 2.6 acres of designated EFH for Pacific coast salmon.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, FHWA 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, mitigating, or 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

FHWA 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

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Data Quality Act) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these Data Quality Act components, documents compliance with the act, 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 are the Federal Highway Administration, WSDOT, Clark County, any private parties or groups interested in water quality and fisheries concerns. Individual copies of this opinion were provided to the FHWA. The

format and naming adheres to conventional standards for style. Consultation by Federal agencies with NMFS is required under section 7 of the ESA whenever a Federal agency approves, funds, or carries out an action that might affect an ESA-listed species. This consultation and opinion was required under the ESA to determine whether a proposal by FHWA to fund construction road improvements and a culvert replacement in Clark County, Washington, would result in jeopardy for ESA-listed species or adverse effects to EFH. This opinion provides both discretionary and non-discretionary terms and conditions designed to avoid and minimize impacts to listed species that may occur during implementation of certain restoration actions.

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 600.920(j).

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

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

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

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