UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No:
WCRO-2023-02915

March 7, 2025

Ralph Rizzo
Division Administrator
Federal Highway Administration, Washington Division
711 Capitol Way South, Suite 501
Olympia, Washington 98501

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the State Route 202 Widening and Trestle Replacement Project

Dear Mr. Rizzo:

This letter responds to your November 13, 2023, request for initiation of consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and analysis because it met our screening criteria and contained all required information on, and analysis of, your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed Federal Highway Administration's (FHWA) consultation request and related initiation package. Where relevant, we have adopted the information and analyses you have provided and/or referenced but only after our independent, science-based evaluation confirmed they meet our regulatory and scientific standards. In our biological opinion below, we indicate what parts of your document we have incorporated by reference and where that information is being incorporated.

We adopt by reference here:

- Pages 2-8 of the Biological Assessment (BA) for the project location and proposed project activities,
- Pages 8-9 of the BA for proposed timeline and construction sequence,
- Pages 9-11 of the BA for best management practices (BMPs) that would be utilized to minimize project impacts,
- Pages 11-14 of the BA for the action area,
- Pages 15-22 of the BA for the status of ESA-listed species and designated critical habitats affected by the proposed action,
- Pages 22-27 of the BA for the environmental baseline of the action area,
- Pages 27-38 of the BA for the effects of the proposed action (including "not likely to adversely affect" [NLAA] effect determinations) and analysis of cumulative effects on ESA-listed species, and
- Appendix F of the BA for the Essential Fish Habitat (EFH) assessment.

We note where we have supplemented information in the BA with our own data analysis. The BA will be included in the administrative record for this consultation and we will send it to readers of the biological opinion as an email reply attachment to requests sent to consultationupdates.wcr@noaa.gov and reference the NMFS No. for this consultation: WCRO-2024-02915.

On November 13, 2023, the FHWA sent NMFS the formal consultation request and the BA. In their BA, the FHWA determined that the proposed action was likely to adversely affect ESA-listed species and designated critical habitat, and adversely affect EFH within the action area. The NMFS reviewed the BA and determined that all information necessary to complete consultation was received. Formal consultation was initiated on February 6, 2025.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

BIOLOGICAL OPINION

Proposed Action

The City of Woodinville (the City), with funding from the FHWA and support from the Washington State Department of Transportation (WSDOT) Highways and Local Programs Division, proposes to convert an existing railroad trestle to a trail, and improve approximately 1,200 linear feet of roadway along State Route (SR) 202, NE 175th Street, and NE 177th Place. The purpose of the project is to improve capacity and reduce traffic congestion on one of the City's most heavily used roadways. The proposed action described in pages 2-8 of the BA is incorporated here. For the convenience of the reader, we summarize this section below.

The proposed action would occur in an urbanized area within the city of Woodinville. No in-water work is proposed and there are no riparian areas, wetlands, or waterbodies in the project area. No new or modified stormwater facilities are proposed because the existing systems installed in 2010 were designed to collect and treat future development within the drainage basin.

Proposed roadway improvements would include:

- replacing the existing railroad trestle over SR 202 (also known as NE 131st Street) with a new clear-span pedestrian bridge;
- converting the existing rail corridor to a trail;

- widening the SR 202 roadway (including installing new sidewalks) between NE 175th Street and NE 177th Place;
- grind and overlay new pavement along SR 202 and at existing intersections; and
- relocate utilities and install landscaping along widened roadway and sidewalks.

Stormwater runoff from existing and proposed pollution generating impervious surfaces (PGIS) for this project would flow into an existing BaySeparator and BayFilter Vault system for treatment prior to discharging into the Sammamish River from an outfall approximately 20 feet west of the western limit of the proposed trestle replacement. These stormwater treatment facilities were designed to collect and treat stormwater for a total tributary area of approximately 52 acres. The project area contains approximately 0.85 acre of existing PGIS and the proposed action would result in approximately 0.04 acre of new PGIS, for a total of approximately 0.89 acre of PGIS post-construction. Existing catch basins will be removed, relocated, and reconnected to the existing stormwater drainage system. No significant changes to the existing stormwater system are proposed.

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). As described in the BA on pages 11 to 14, the action area is comprised of a terrestrial area and an aquatic area. The terrestrial area is the project footprint and the area in which construction noise would be elevated from baseline levels, estimated to be approximately 7,100 feet radially from the source. The aquatic component of the action area extends downstream from the Sammamish River, into Lake Washington, and eventually to Puget Sound through the Ballard Locks (approximately 23 miles). The Sammamish River fall-run population of Puget Sound (PS) Chinook salmon, the North Lake Washington / Lake Sammamish winter-run population of PS steelhead, and designated critical habitat for PS Chinook salmon are most likely to be affected by the proposed action.

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 impacts to listed species or designated critical habitat from federal agency activities or existing federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02). We incorporate by reference the Environmental Baseline section of the BA on pages 22 to 27.

Status of Species and Designated Critical Habitat

We examined the status of each species that would be adversely affected by the proposed action to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. We also examined the condition of critical habitat throughout the designated area and discuss the function of the physical or biological features essential to the conservation of the species that create the conservation value of that habitat. We incorporate by reference the Species Status/Presence section of the BA on pages 15 to 22. We supplement the BA with NMFS' most recent information on status of species and critical habitat, including the influence of climate on each.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Major ecological realignments are already occurring in response to climate change (IPCC WGII 2022). Long-term trends in warming have continued at global, national and regional scales. Global surface temperatures in the last decade (2010s) were estimated to be 1.09 °C higher than the 1850-1900 baseline period, with larger increases over land ~1.6 °C compared to oceans ~0.88 (IPCC WGI 2021). The vast majority of this warming has been attributed to anthropogenic releases of greenhouse gases (IPCC WGI 2021). Globally, 2014-2018 were the 5 warmest years on record both on land and in the ocean (2018 was the 4th warmest) (NOAA NCEI 2022). Events such as the 2013-2016 marine heatwave (Jacox et al. 2018) have been attributed directly to anthropogenic warming in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). Global warming and anthropogenic loss of biodiversity represent profound threats to ecosystem functionality (IPCC WGII 2022). These two factors are often examined in isolation, but likely have interacting effects on ecosystem function.

Climate change is systemic, influencing freshwater, estuarine, and marine conditions. Other systems are also being influenced by changing climatic conditions. Literature reviews on the impacts of climate change on Pacific salmon (Crozier 2015, 2016, 2017, Crozier and Siegel 2018, Siegel and Crozier 2019, 2020) have collected hundreds of papers documenting the major themes relevant for salmon. Here we describe habitat changes relevant to Pacific salmon and steelhead, prior to describing how these changes result in the varied specific mechanisms impacting these species in subsequent sections.

Forests

Climate change will impact forests of the western U.S., which dominate the landscape of many watersheds in the region. Forests are already showing evidence of increased drought severity, forest fire, and insect outbreak (Halofsky et al. 2020). Additionally, climate change will affect tree reproduction, growth, and phenology, which will lead to spatial shifts in vegetation. Halofsky et al. (2018) projected that the largest changes will occur at low- and high-elevation forests, with expansion of low-elevation dry forests and diminishing high-elevation cold forests and subalpine habitats.

Forest fires affect salmon streams by altering sediment load, channel structure, and stream temperature through the removal of canopy. Holden et al. (2018) examined environmental factors contributing to observed increases in the extent of forest fires throughout the western U.S. They found strong correlations between the number of dry-season rainy days and the annual extent of forest fires, as well as a significant decline in the number of dry-season rainy days over the study period (1984-2015). Consequently, predicted decreases in dry-season precipitation, combined with increases in air temperature, will likely contribute to the existing trend toward more extensive and severe forest fires and the continued expansion of fires into higher elevation and wetter forests (Alizedeh 2021).

Agne et al. (2018) reviewed literature on insect outbreaks and other pathogens affecting coastal Douglas-fir forests in the Pacific Northwest and examined how future climate change may influence disturbance ecology. They suggest that Douglas-fir beetle and black stain root disease could become more prevalent with climate change, while other pathogens will be more affected by management practices. Agne et al. (2018) also suggested that due to complex interacting effects of disturbance and disease, climate impacts will differ by region and forest type.

Freshwater Environments

The following is excerpted from Siegel and Crozier (2019), who present a review of recent scientific literature evaluating effects of climate change, describing the projected impacts of climate change on instream flows:

Cooper et al. (2018) examined whether the magnitude of low river flows in the western U.S., which generally occur in September or October, are driven more by summer conditions or the prior winter's precipitation. They found that while low flows were more sensitive to summer evaporative demand than to winter precipitation, interannual variability in winter precipitation was greater. Malek et al. (2018), predicted that summer evapotranspiration is likely to increase in conjunction with declines in snowpack and increased variability in winter precipitation. Their results suggest that low summer flows are likely to become lower, more variable, and less predictable.

The effect of climate change on ground water availability is likely to be uneven. Sridhar et al. (2018) coupled a surface-flow model with a ground-flow model to improve predictions of surface water availability with climate change in the Snake River Basin. Projections using RCP 4.5 and 8.5 emission scenarios suggested an increase in water table heights in downstream areas of the basin and a decrease in upstream areas.

As cited in Siegel and Crozier (2019), Isaak et al. (2018), examined recent trends in stream temperature across the Western U.S. using a large regional dataset. Stream warming trends paralleled changes in air temperature and were pervasive during the low-water warm seasons of 1996-2015 (0.18-0.35°C/decade) and 1976-2015 (0.14-0.27°C/decade). Their results show how continued warming will likely affect the cumulative temperature exposure of migrating sockeye salmon (*O. nerka*) and the availability of suitable habitat for brown trout (*Salmo trutta*) and rainbow trout (*O. mykiss*). Isaak et al. (2018) concluded that most stream habitats will likely remain suitable for salmonids in the near future, with some becoming too warm. However, in cases where habitat access is currently restricted by dams and other barriers salmon and steelhead will be confined to downstream reaches typically most at risk of rising temperatures unless passage is restored (FitzGerald et al. 2020, Myers et al. 2018).

Streams with intact riparian corridors and that lie in mountainous terrain are likely to be more resilient to changes in air temperature. These areas may provide refuge from climate change for a number of species, including Pacific salmon. Krosby et al. (2018), identified potential stream refugia throughout the Pacific Northwest based on a suite of features thought to reflect the ability of streams to serve as such refuges. Analyzed features include large temperature gradients, high canopy cover, large relative stream width, low exposure to solar radiation, and low levels of human modification. They created an index of refuge potential for all streams in the region, with mountain area streams scoring highest. Flat lowland areas, which commonly contain migration corridors, were generally scored lowest, and thus were prioritized for conservation and restoration. However, forest fires can increase stream temperatures dramatically in short time-spans by removing riparian cover (Koontz et al. 2018), and streams that lose their snowpack with climate change may see the largest increases in stream temperature due to the removal of temperature buffering (Yan et al. 2021). These processes may threaten some habitats that are currently considered refugia.

Marine and Estuarine Environments

Along with warming stream temperatures and concerns about sufficient groundwater to recharge streams, a recent study projects nearly complete loss of existing tidal wetlands along the U.S. West Coast, due to sea level rise (Thorne et al. 2018). California and Oregon showed the greatest threat to tidal wetlands (100%), while 68% of Washington tidal wetlands are expected to be submerged. Coastal development and steep topography prevent horizontal migration of most wetlands, causing the net contraction of this crucial habitat.

Rising ocean temperatures, stratification, ocean acidity, hypoxia, algal toxins, and other oceanographic processes will alter the composition and abundance of a vast array of oceanic species. In particular, there will be dramatic changes in both predators and prey of Pacific salmon, salmon life history traits and relative abundance. Siegel and Crozier (2019) observe that changes in marine temperature are likely to have a number of physiological consequences on fishes themselves. For example, in a study of small planktivorous fish, Gliwicz et al. (2018) found that higher ambient temperatures increased the distance at which fish reacted to prey. Numerous fish species (including many tuna and sharks) demonstrate regional endothermy, which in many cases augments eyesight by warming the retinas. However, Gliwicz et al. (2018) suggest that ambient temperatures can have a similar effect on fish that do not demonstrate this trait. Climate change is likely to reduce the availability of biologically essential omega-3 fatty acids produced by phytoplankton in marine ecosystems. Loss of these lipids may induce cascading trophic effects, with distinct impacts on different species depending on compensatory mechanisms (Gourtay et al. 2018). Reproduction rates of many marine fish species are also likely to be altered with temperature (Veilleux et al. 2018). The ecological consequences of these effects and their interactions add complexity to predictions of climate change impacts in marine ecosystems.

Perhaps the most dramatic change in physical ocean conditions will occur through ocean acidification and deoxygenation. It is unclear how sensitive salmon and steelhead might be to the direct effects of ocean acidification because of their tolerance of a wide pH range in freshwater (although see Ou et al. 2015 and Williams et al. 2019), however, impacts of ocean acidification and hypoxia on sensitive species (e.g., plankton, crabs, rockfish, groundfish) will likely affect salmon indirectly through their interactions as predators and prey. Similarly, increasing frequency and duration of harmful algal blooms may affect salmon directly, depending on the toxin (e.g., saxitoxin vs domoic acid), but will also affect their predators (seabirds and mammals). The full effects of these ecosystem dynamics are not known but will be complex. Within the historical range of climate variability, less suitable conditions for salmonids (e.g., warmer temperatures, lower streamflows) have been associated with detectable declines in many of these listed units, highlighting how sensitive they are to climate drivers (Ford 2022, Lindley et al. 2009, Williams et al. 2016, Ward et al. 2015). In some cases, the combined and potentially additive effects of poorer climate conditions for fish and intense anthropogenic impacts caused the population declines that led to these population groups being listed under the ESA (Crozier et al. 2019).

Climate Change Effects on Salmon and Steelhead

In freshwater, year-round increases in stream temperature and changes in flow will affect physiological, behavioral, and demographic processes in salmon, and change the species with which they interact. For example, as stream temperatures increase, many native salmonids face increased competition with more warm-water tolerant invasive species. Changing freshwater temperatures are likely to affect incubation and emergence timing for eggs, and in locations where the greatest warming occurs may affect egg survival, although several factors impact intergravel temperature and oxygen (e.g., groundwater influence) as well as sensitivity of eggs to thermal stress (Crozier et al. 2020). Changes in temperature and flow regimes may alter the amount of habitat and food available for juvenile rearing, and this in turn could lead to a restriction in the distribution of juveniles, further decreasing productivity through density dependence. For migrating adults, predicted changes in freshwater flows and temperatures will likely increase exposure to stressful temperatures for many salmon and steelhead populations, and alter migration travel times and increase thermal stress accumulation for ESUs or DPSs with early-returning (i.e. spring- and summer-run) phenotypes associated with longer freshwater holding times (Crozier et al. 2020, FitzGerald et al. 2020). Rising river temperatures increase the energetic cost of migration and the risk of en route or pre-spawning mortality of adults with long freshwater migrations, although populations of some ESA-listed salmon and steelhead may be able to make use of cool-water refuges and run-timing plasticity to reduce thermal exposure (Keefer et al. 2018, Barnett et al. 2020).

Marine survival of salmonids is affected by a complex array of factors including prey abundance, predator interactions, the physical condition of salmon within the marine environment, and carryover effects from the freshwater experience (Holsman et al. 2012, Burke et al. 2013). It is generally accepted that salmon marine survival is size-dependent, and thus larger and faster growing fish are more likely to survive (Gosselin et al. 2021). Furthermore, early arrival timing in the marine environment is generally considered advantageous for populations migrating through the Columbia River. However, the optimal day of arrival varies across years, depending on the seasonal development of productivity in the California Current, which affects prey available to salmon and the risk of predation (Chasco et al. 2021). Siegel and Crozier (2019) point out the concern that for some salmon populations, climate change may drive mismatches between juvenile arrival timing and prey availability in the marine environment. However, phenological diversity can contribute to metapopulation-level resilience by reducing the risk of a complete mismatch. Carr-Harris et al. (2018), explored phenological diversity of marine migration timing in relation to zooplankton prey for sockeye salmon O. nerka from the Skeena River of Canada. They found that sockeye migrated over a period of more than 50 days, and populations from higher elevation and further inland streams arrived in the estuary later, with different populations encountering distinct prey fields. Carr-Harris et al. (2018) recommended that managers maintain and augment such life-history diversity.

Synchrony between terrestrial and marine environmental conditions (e.g., coastal upwelling, precipitation and river discharge) has increased in spatial scale causing the highest levels of synchrony in the last 250 years (Black et al. 2018). A more synchronized climate combined with simplified habitats and reduced genetic diversity may be leading to more synchrony in the productivity of populations across the range of salmon (Braun et al. 2016). For example, salmon productivity (recruits/spawner) has also become more synchronized across Chinook populations from Oregon to the Yukon (Dorner et al. 2018, Kilduff et al. 2014). In addition, Chinook salmon have become smaller and younger at maturation across their range (Ohlberger et al. 2018). Other Pacific salmon species (Stachura el al. 2014) and Atlantic salmon (Olmos et al. 2020) also have demonstrated synchrony in productivity across a broad latitudinal range.

At the individual scale, climate impacts on salmon in one life stage generally affect body size or timing in the next life stage and negative impacts can accumulate across multiple life stages (Healey 2011; Wainwright and Weitkamp 2013, Gosselin et al. 2021). Changes in winter precipitation will likely affect incubation and/or rearing stages of most populations. Changes in the intensity of cool season precipitation, snow accumulation, and runoff could influence migration cues for fall, winter and spring adult migrants, such as coho and steelhead. Egg survival rates may suffer from more intense flooding that scours or buries redds. Changes in hydrological regime, such as a shift from mostly snow to more rain, could drive changes in life history, potentially threatening diversity within an ESU (Beechie et al. 2006). Changes in summer temperature and flow will affect both juvenile and adult stages in some populations, especially those with yearling life histories and summer migration patterns (Crozier and Zabel 2006; Crozier et al. 2010, Crozier et al. 2019).

At the population level, the ability of organisms to genetically adapt to climate change depends on how much genetic variation currently exists within salmon populations, as well as how selection on multiple traits interact, and whether those traits are linked genetically. While genetic diversity may help populations respond to climate change, the remaining genetic diversity of many populations is highly reduced compared to historic levels. For example, Johnson et al. (2018), compared genetic variation in Chinook salmon from the Columbia River Basin between contemporary and ancient samples. A total of 84 samples determined to be Chinook salmon were collected from vertebrae found in ancient middens and compared to 379 contemporary samples. Results suggest a decline in genetic diversity, as demonstrated by a loss of mitochondrial haplotypes as well as reductions in haplotype and nucleotide diversity. Genetic losses in this comparison appeared larger for Chinook from the mid-Columbia than those from the Snake River Basin. In addition to other stressors, modified habitats and flow regimes may create unnatural selection pressures that reduce the diversity of functional behaviors (Sturrock et al. 2020). Managing to conserve and augment existing genetic diversity may be increasingly important with more extreme environmental change (Anderson et al. 2015), though the low levels of remaining diversity present challenges to this effort (Freshwater 2019). Salmon historically maintained relatively consistent returns across variation in annual weather through the portfolio effect (Schindler et al. 2015), in which different populations are sensitive to different climate drivers. Applying this concept to climate change, Anderson et al (2015) emphasized the additional need for populations with different physiological tolerances. Loss of the portfolio increases volatility in fisheries, as well as ecological systems, as demonstrated for Fraser River and Sacramento River stock complexes (Freshwater et al. 2019, Munsch et al. 2022).

Status of PS Chinook Salmon

The status of PS Chinook salmon is described on pages 19 and 20 of the BA and is incorporated here. The NMFS supplements this section with information on the population present within the action area.

The PS Chinook salmon population that occurs in the action area is the fall-run Sammamish River population. This population is small, with a total abundance that has fluctuated from an average of about 576 total spawners in 1990-1994, to 1,289 spawners in 2005-2009, to 879 spawners in 2015-2019. Natural-origin spawners comprise a small proportion of the total population, and the trend in natural-origin spawners is negative (Ford 2022). Natural-origin spawners accounted for only about 7% of the 3,196-total return in 2023 (WDFW 2025a). Key factors limiting natural-origin Chinook recovery in the Lake Washington/Cedar/Sammamish Watershed are limited juvenile rearing capacity in Bear Creek, Sammamish River, and Cedar River causing more juveniles to rear in Lake Washington, increasing their risk to predation and low survival during marine maturation (King County 2022). Improving freshwater habitat conditions has been identified to be especially important for all species for spawning and rearing success and to improve recovery (WRIA 8 Salmon Recovery Council 2017). The Sammamish River population spawns primarily in Issaquah Creek, Bear Creek, and Cottage Lake Creek, over 8 river miles upstream of the location of the project outfall into the Sammamish River.

Status of PS Steelhead

The status of PS steelhead is described on page 21 of the BA and is incorporated here. The NMFS supplements this section with information on the population present within the action area.

The PS steelhead that occur in the action area are winter-run fish from the North Lake Washington / Lake Sammamish population, which is among the smallest populations of the DPS (NWFSC 2015; WDFW 2025b). The Washington Department of Fish and Wildlife (WDFW) reports that the total abundance for PS steelhead in this basin fluctuated between 0 and 916 individuals between 1984 and the last survey in 1999, with a strong negative trend. North Lake

Washington and Sammamish tributaries have not been monitored since 2000, and due to small numbers of steelhead seen at the Ballard Locks and estimated in the Cedar River, it is unlikely that there are currently many steelhead in these tributaries. Abundance never exceeded 45 fish after 1992 (WDFW 2025b). The Northwest Fisheries Science Center (NWFSC 2015) disagrees with WDFW in that returns may have been above 1,500 individuals during the mid-1980s, but NWFSC agrees with the steep decline to virtually no steelhead in the basin since 2000.

Status of Critical Habitat

The status of designated critical habitat for Chinook salmon is described on pages 19 and 20 of the BA and is incorporated here. The nearest designated critical habitat for Chinook salmon is Lake Washington, approximately 6 river miles downstream of the project's outfall into the Sammamish River.

Finally, we examined the likely effects on any listed species and critical habitats that your agency made "not likely to adversely affect" determinations for. Our conclusions regarding the effects of the action on those species and critical habitats is presented below under the heading: NLAA determinations.

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.

The biological assessment provides a detailed discussion and comprehensive assessment of the effects of the proposed action in Sections 4 and 5 of the BA (pages 27 to 38), and is adopted here (50 CFR 402.14(h)(3)). NMFS has evaluated these sections and after our independent, science-based evaluation determined it meets our regulatory and scientific standards. The NMFS supplements the BA by providing an evaluation of the effects of additional PGIS resulting in stormwater discharges on the species and critical habitat.

No in-water work is proposed and there are no riparian areas, wetlands, or waterbodies in the project area. No new or modified stormwater facilities are proposed because the existing systems installed in 2010 were designed to collect and provide basic treatment for up to 52 acres within the drainage basin. The proposed action would result in a net increase of approximately 0.04 acre of new PGIS for a total of approximately 0.89 acre of new, replaced, and existing PGIS at the intersections of SR 202, NE 177th Place, and NE 175th Street. Pre-project conditions includes approximately 0.85 acre of existing PGIS within the project area that is conveyed through the existing BaySeparator pre-treatment system and BayFilter vault prior to discharging into the Sammamish River from an outfall approximately 20 feet west of the western limit of the project footprint. Existing catch basins will be removed, relocated, and reconnected to the existing stormwater drainage system. No significant changes to the existing stormwater system are proposed.

Stormwater runoff, despite treatment, often contains residual contaminant and stormwater runoff is a major contributing factor to water quality impairments throughout Washington State (EPA 2020). Water quality would be affected by increased turbidity from roadway runoff and also be affected by the introduction of toxic materials from pollution generating impervious surfaces. Exposure to roadway-related degraded water quality is likely to adversely affect all life stages of PS Chinook salmon and PS steelhead trout throughout the action area.

Stormwater effects to ESA-listed species will occur during and after each discharge of treated and untreated runoff that will occur throughout the design life of the proposed project. Although the project would treat the stormwater produced by the proposed new, replaced, and existing PGIS, it is likely that untreated stormwater will still enter the Sammamish River and flow downstream, where concentrations will be diluted, but would introduce chronic low levels of contamination ultimately to Puget Sound. The duration and severity of effects will vary with site and event-specific characteristics, such as average traffic volume in the project area (amount of pollutant to be carried by stormwater), precipitation volume (concentration of pollutant in the stormwater), and the volume of flow in the Sammamish River, through Lake Washington, to the Ballard Locks (rate of dilution of the stormwater).

Pollutant effects

Traffic-related contaminants include PAHs, heavy metals, and a growing list of contaminants, including tire wear particles containing 6PPD-quinone (Peter et al. 2018; Tian et al. 2020). These pollutants will become more concentrated on impervious surfaces until they either degrade in place or are transported by wind, precipitation, or active site management. Stormwater contaminants that accumulate on roadway surfaces are prevalent in higher concentrations in urban creeks during the initial phase (“first flush”) of rain events, but contaminants continue to be present throughout the duration of and immediately following such storms (Peter et al. 2020).

Zinc: A common component of road surface runoff (vehicle emissions, motor oils, lubricants, tires, and fuel oils), several species of zinc are highly mobile in aquatic environments, are often transported many miles downstream, and eventually load to sediments. Zinc interacts with many chemicals and aquatic conditions of reduced pH and dissolved oxygen, low DOC, and elevated temperatures increase zinc toxicity, causing altered patterns of accumulation, metabolism, and toxicity (Eisler 1993; Farag et al. 1998). Many aquatic invertebrates (prey) and some fish may be adversely affected from ingesting zinc-contaminated particulates (Farag et al. 1998). In freshwater fish, excess zinc affects the gill epithelium, which leads to internal tissue hypoxia, reduced immunity, and may acutely include osmoregulatory failure, acidosis, and low oxygen tensions in arterial blood (Eisler 1993). Toxicity of zinc mixtures with other metals is mostly additive; however, toxicity of zinc-copper mixtures is more than additive (or synergistic) for freshwater fish and amphipods (Skidmore 1964).

Copper: Copper from automobiles is one of the most common heavy metals contaminating stormwater, especially stormwater originating from parking lots. Copper is highly toxic to aquatic biota and toxic effects across salmonid species including PS Chinook salmon and PS steelhead trout, which can experience a variety of acute and chronic lethal and sub-lethal effects (Baldwin et al. 2011). Copper bio-accumulates in invertebrates and fish (Feist et al. 2005; Layshock et al. 2021), is redox-active, and interacts with or alters many compounds in mixtures (Gauthier et al. 2015). Copper-PAH mixtures, which synergistically interact are highly toxic through several exacerbating mechanisms: copper weakens cell membranes increasing absorption of PAHs, copper chelates or hastens and preserves the bio-accumulative toxicity of PAHs; and PAHs in turn increase the bio-accumulative and redox properties of Copper (Gauthier et al. 2015). Sub-lethal effects of copper include avoidance at very low concentrations (Hecht et al. 2007) and reduced chemosensory function at slightly higher concentrations, which in turn causes maladaptive behaviors, including inability to avoid copper or to detect chemical alarm signals (McIntyre et al. 2012). Sandahl et al. (2007) demonstrated that copper concentration as low as 2 micrograms/liter can significantly impair the olfactory system of salmonids and hinder their predator avoidance behavior. Thus, any fish that are exposed to stormwater containing high concentrations of copper may experience diminishment of predator avoidance ability and would be at greater risk of predation. Appreciable adverse effects among fishes can be expected with increases as small as 0.6 μg/L above background concentrations (NMFS 2014).

Polycyclic Aromatic Hydrocarbons (PAHs): Petroleum-based contaminants are usually in the form of two or more condensed aromatic carbon rings, include more than 100 different chemicals, and usually occur as complex mixtures in the environment. Major human-related sources released to the environment are from wood stoves, creosote treated wood, and vehicle emissions, plastics including tire wear particles, improper motor oil disposal, leaks, and asphalt sealants (Ecology 2023). PAHs are lipophilic, persistent, interact synergistically with bio-accumulative and redox-active metals and other contaminants, and may disperse long-distances in water (Arkoosh et al. 2011; Gauthier et al. 2014, 2015; Ecology 2023). Metabolites are commonly more toxic than the parent, some are carcinogenic, neurotoxic, and cause genetic damage. Although biotransformation of PAHs causes oxidative stress with subsequent cellular damage and increased energy is required at the cost of growth, many organisms (including salmon) can eliminate at least the lower density PAHs from their bodies as part of metabolism and excretion (Arkoosh et al. 2011). However, plants and some aquatic organisms, such as mussels and lamprey, have limited ability to metabolize or degrade PAHs, which may bioaccumulate over several years (Tian et al. 2019; Nilsen et al. 2015). The environmental fate of each type of PAH depends on its molecular weight. In surface water, PAHs can volatilize, photolyze, oxidize, biodegrade, bind to suspended particles or sediments, or accumulate in aquatic organisms, with bioconcentration factors often in the 10-10,000 range. In sediments, PAHs can biodegrade or accumulate in aquatic organisms or non-living organic matter. Some evaporate into the air from the surface but most do not easily dissolve in water, some evaporate into the air from surface waters, but most stick to solid particles and settle into sediments.

Changes in pH and hardness may increase or decrease the toxicity of PAHs, and the variables of organic decay further complicate their environmental pathway (Santore et al. 2001). Many of the pollutants that may enter the water column due to project activities can cause effects in exposed fish that range from avoidance of an affected area, to reduced growth, altered immune function, and immediate mortality in exposed individuals. The intensity of effects depends largely on the pollutant, its concentration, and/or the duration of exposure (Brette et al. 2014; Feist et al. 2011;

Gobel et al. 2007; Incardona et al. 2004, 2005, and 2006; Mcintyre et al. 2012; Meador et al. 2006; Sandahl et al. 2007; Spromberg et al. 2016). PAHs and metabolites are acutely toxic to salmonids and may cause narcosis at low levels of exposure, can in some cases bioaccumulate through food webs (water, groundwater, soil, and plants; Bravo et al. 2011; Zhang et al. 2016), and can also cause chronic sub-lethal effects to aquatic organisms at very low levels (Neff 1982; Varanasi et al. 1985; Meador et al. 2006). PAHs can affect DNA within the nucleus of cells, cause genetic damage, and are classified as carcinogens (Collier et al. 2014). These ubiquitous pollutants (PAHs) are a source of potent adverse effects to salmon and steelhead, even at ambient levels (Loge et al. 2006; Sandahl et al. 2007; Spromberg and Meador 2006).

6PPD-quinone: After years of forensic investigation, the urban runoff coho mortality syndrome has now been directly linked to motor vehicle tires, which deposit the compound 6PPD and its abiotic transformation product 6PPD-q onto roads. 6PPD or [(N-(1, 3-dimethylbutyl)-N'-phenyl-p-phenylenediamine] is used to preserve the elasticity of tires. 6PPD can transform in the presence of ozone (O3) to 6PPD-q. 6PPD-q is ubiquitous to roadways (Sutton et al. 2019) and was identified by Tian et al. (2020) as the primary cause of urban runoff coho mortality syndrome described by Scholz et al. (2011). Laboratory studies have demonstrated that juvenile coho salmon (Chow et al. 2019), juvenile steelhead, and juvenile Chinook salmon are also susceptible to varying degrees of mortality when exposed to urban stormwater (French et al. 2022). Fortunately, recent literature has also shown that mortality can be prevented by infiltrating road runoff through soil media containing organic matter, which removes 6PPD-q and other contaminants (Fardel et al. 2020; Spromberg et al. 2016; McIntyre et al. 2015; McIntyre et al. 2023). Research and corresponding adaptive management surrounding 6PPD is rapidly evolving. Nevertheless, key findings to date include:

- Preliminary evidence indicates an uneven vulnerability across species of Puget Sound salmon and steelhead, and a need to further investigate sublethal toxicity to steelhead and Chinook salmon. For example, McIntyre et al. (2018) indicate that chum do not experience the lethal response to stormwater observed in coho salmon.
- Effects from 6PPD-q on Chinook salmon and steelhead trout are more recently studied by French (2022) who demonstrated that relative to coho salmon, who demonstrate mortal response quickly, the progressions of symptoms on Chinook salmon and steelhead trout were qualitatively the same, where they exhibited surface swimming and gaping, loss of equilibrium albeit with a delayed onset and longer window for mortality, once exposed to 6PPD-q.
- Following exposure, the onset of mortality is more delayed in steelhead and Chinook salmon (French et al. 2022).
- The mechanisms underlying mortality in salmonids is under investigation, but are likely to involve cardiorespiratory disruption, consistent with symptomology. Recently, Greer (2023) has demonstrated that 6ppd-quinone induces mortality and disrupts vascular permeability pathways in developing coho salmon. Therefore, special consideration should be given to parallel habitat stressors that also affect the salmon gill and heart, and nearly always co-occur with 6PPD such as temperature (as a proxy for climate change impacts at the salmon population-scale) and PAHs.

- Simple and inexpensive green infrastructure mitigation methods are promising in terms of the protections they afford salmon and stream invertebrates, but much more work is needed (McIntyre 2014, 2015, 2016; Spromberg 2016).

Repeated and chronic exposures, even of very low levels of toxins in stormwater, are still likely to injure or kill individual fish, by themselves and through synergistic interactions with other contaminants already present in the water (Baldwin et al. 2008; Feist et al. 2011; Hicken et al. 2011; Spromberg and Meador 2006; Spromberg and Scholz 2011). Santore et al. (2001) indicates that the presence of natural organic matter and changes in pH and hardness affect the potential for toxicity (both increase and decrease). Additionally, organic matter (living and dead) can adsorb and absorb other pollutants such as PAHs. The variables of organic decay further complicate the path and cycle of pollutants in the freshwater environment.

Many stormwater pollutants travel long distances either in solution, adsorbed to suspended particles, or else they are retained in sediments, particularly clay and silt, which can only be deposited in areas of reduced water velocity, such as behind dams or backwater and off- channel areas, until they are mobilized and transported by future sediment moving flows (Alpers et al. 2000a; Alpers et al. 2000b; Anderson et al. 1996). Wagner et al. (2018) reported that the fate and downstream transport of tire wear particles is dependent upon the density and composition of the mixture. Since tire wear particles are composed of lower density materials (rubber and carbon black) than those in asphalt or other particulate matter suspended in runoff (gravel, plastics, etc.), it is likely that tire wear particles remain in suspension and travel further downstream (Wagner et al. 2018). Further, the main components of tire wear particles are anticipated to resist biodegradation and persist in the environment, potentially contributing toxins over extended periods of time (Wagner et al. 2018). Therefore, based on water transport and sediments affected by certain likely contaminants (PAHs and 6PPD-q for example) (Zhang et al 2016), we analyzed the environmental effects of stormwater runoff extending from the outfall into the Sammamish River downstream to Puget Sound through the Ballard Locks (approximately 23 miles).

It is likely given the permanent and episodic nature of stormwater discharges and their ability to travel downstream, that fish using the Sammamish River downstream to Puget Sound will be exposed to some level of contamination. We cannot predict the number or duration of each pulse of discharge events, nor the number of individual fishes that would be exposed during those events.

We expect that every year some individuals of all life stages of PS Chinook salmon and PS steelhead trout would experience sublethal effects such as stress and reduced prey consumption as a result of stormwater runoff pollutants. Not all exposed individuals would experience immediate adverse effects, and latent health effects are difficult to discern and document. We cannot estimate the number of individuals that would experience adverse effects from exposure to stormwater with any meaningful level of accuracy. Some individuals would respond with avoidance behaviors that disrupt feeding and migratory behavior. Others would experience reduced growth, impairment of essential behaviors related to successful rearing and migration, cellular trauma, physiological trauma, reproductive failure, and mortality. These effects reduce fitness and likelihood of survival among an indeterminate number of individuals in all exposed cohorts for the foreseeable future.

Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The BA describes the cumulative effects on page 35 and that section is incorporated by reference here.

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 to the environmental baseline and the cumulative effects, taking into account the status of the species and critical habitat, to formulate the agency’s biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species. The potential for adverse effects from the proposed action are limited by the following three observations.

The statuses of PS Chinook salmon and PS steelhead trout are threatened. The populations of these species in the action area are extremely small and their recovery is threatened by reduced or eliminated accessibility to historically important habitat combined with degraded conditions in available habitat due to land use activities. The environmental baseline within the action area has been degraded by the effects of intense streambank and shoreline development, nearby industry, urbanization, agriculture, forestry, water diversion, and road building and maintenance. To this we add the effects of the proposed action.

As described above, PS Chinook salmon and PS steelhead trout exposed to stormwater runoff are most likely to have sublethal responses that could ultimately result in earlier mortality than would occur in more fit fish. However, the proposed action’s increment of take, when added to the baseline, and considering the status of the species, is not large enough to discernibly alter current abundance and productivity and therefore is unlikely to reduce the survival and recovery of a listed species or appreciably diminish the value of designated or proposed critical habitat.

The proposed stormwater condition would include minor additional PGIS that would be treated with existing treatment facilities, which will decrease but not eliminate the potential for contaminants in stormwater. Effects of continued discharge of pollutants, albeit slightly reduced, are a chronic degradation in the water quality PBF of PS Chinook salmon designated critical habitat, with a slight reduction in value to survival, growth, and fitness among some of the exposed individuals from each successive cohort of the exposed populations for the foreseeable future. We consider the effects of the proposed action, from construction and future roadway use, when added to the baseline, and in consideration of the proposed treatment and status of critical habitat, will be slightly negative to the PBF but insufficient to appreciably reduce the conservation value of the critical habitat.

Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of PS Chinook salmon or PS steelhead trout, or destroy or adversely modify PS Chinook salmon designated critical habitat.

INCIDENTAL TAKE STATEMENT

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

Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur in the form of harm, as a result of reduced prey base from degraded water quality (trophic effects), and harm from direct exposure to contaminants in stormwater runoff, including to 6PPD and 6PPD-q.

We cannot estimate the number of listed fish that would be exposed to stormwater discharge events, nor can we estimate the number of fish that would experience adverse effects from reduced prey base and exposure to stormwater with any meaningful level of accuracy. In such circumstances, NMFS provides an "extent of take" which is based on an observable aspect of the proposed action causally related to the harm.

In this case, the extent of take is 0.89 acre of pollution generating impervious surface (0.85 acre of existing and 0.04 acre of new). This extent is easily observable, and is causally related to the source of harm, as a larger impervious area would contribute more stormwater runoff and that increased volume would increase the area affected and increase load of contaminants, exposing more individuals of the listed species and their prey. Reinitiation shall be triggered if additional PGIS is constructed.

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.

Reasonable and Prudent Measures

“Reasonable and prudent measures” refer to those actions the Director considers necessary or appropriate to minimize the impact of the incidental take on the species (50 CFR 402.02).

The FWHA shall require the City of Woodinville to:

1. Minimize incidental take associated with operational effects from stormwater.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The 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 ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:
    a. Ensure the project does not exceed the design specifications and creates no more than 0.89 acre of new and replaced pollutant generating impervious surface (PGIS). The FHWA shall provide an As-built report including the total area of both new and replaced PGIS to NMFS within 90 days following project completion. This report should be sent to projectreports.wcr@noaa.gov including “Attn: WCRO-2023-02915” within the subject line.
    b. Construct and maintain stormwater treatment facilities to maximize the removal of stormwater pollutants. Specifically, the City shall:
        i. Maintain records of inspection and maintenance to document compliance with the maintenance standards provided in the King County Stormwater Design Manual. Records do not need to be provided to NMFS unless requested.

Conservation Recommendations

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

1. Employ adaptive management of stormwater treatment to address lack of treatment effectiveness, new science, or contaminants of emerging concern.
2. Develop and implement a regular street sweeping maintenance schedule to remove tire particles and contaminants from the roadway.
3. Participate in a monitoring and reporting program, such as the Washington Department of Ecology Stormwater Action Monitoring (SAM), which monitors stormwater pollutants. The project's treatment facilities can be proposed to the SAM program as a preferred monitoring location to inform BMP effectiveness.

NLAA Determinations

We reviewed the Federal Highway Administration's consultation request document and related materials, including a NLAA determination detailed on pages 37 and 38 of the BA. Based on our knowledge, expertise, and your action agency's materials, we concur with the action agency's conclusions that the proposed action is not likely to adversely affect the following NMFS ESA-listed species and designated critical habitat: Southern Resident Killer Whales (SRKW)

Reinitiation of Consultation

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

ESSENTIAL FISH HABITAT RESPONSE

Thank you also for your request for essential fish habitat (EFH) consultation. NMFS reviewed the proposed action for potential effects on EFH pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. We have concluded that the action would adversely affect EFH designated under the Pacific Coast Salmon Fishery Management Plan. EFH conservation recommendations are provided below to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

Magnuson-Stevens Fishery Conservation and Management Act

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

EFH Affected by the Proposed Action

The proposed project occurs within EFH for various federally managed fish species within the Pacific Coast Salmon Fishery Management Plan. The BA describes the EFH analysis in Appendix F; that section is incorporated by reference here.

Adverse Effects on EFH

NMFS determined the proposed action would adversely affect EFH as follows:

1. Water quality – The proposed action would cause short- and long-term incremental adverse effects on this attribute. Over the life of the expanded roadway, treated and untreated stormwater would discharge residual levels of petroleum-based pollutants, metals, and other contaminants into the Sammamish River, Lake Washington, Lake Union, Ship Canal, and the Ballard Locks. The action would cause no measurable changes in water temperature or salinity. We substantiate the adverse water quality outcomes here by indicating that habitat becomes unsuitable for coho, which is part of the Pacific Salmon FMP:
    a. 6PPD/6PPD-q has been killing coho in Puget Sound urban streams for decades, dating back to at least the 1980s, likely longer (McCarthy, Incardona and Scholz 2008; Scholz et al. 2011).
    b. Source-sink metapopulation dynamics (mediated by straying) are likely to place a significant drag on the future abundances of wild coho salmon in upland forested watersheds (the last best places for coho conservation in Puget Sound). In other words, urban mortality syndrome experienced in one part of the watershed could lead to abundance reductions in other populations because fewer fish are available to stray (Spromberg and Scholz 2011).

   c. Coho are extremely sensitive to 6PPD-q, more so than most other known contaminants in stormwater (Scholz et al. 2011; Chow et al. 2019; Tian 2020).
   d. Coho juveniles appear to be similarly susceptible to the acutely lethal toxicity of 6PPD/6PPD-q (McIntyre et al. 2015; Lo et al. 2023).
   e. The onset of mortality is very rapid in coho (i.e., within the duration of a typical runoff event) (French et al. 2022).
   f. Once coho become symptomatic, they do not recover, even when returned to clean water (Chow et al.2019).
   g. It does not appear that dilution will be the solution to 6PPD pollution, as diluting roadway runoff in 95% clean water is not sufficient to protect coho from the mortality syndrome (French et al. 2022).

2. Prey availability – The proposed action would cause short- and long-term low level but chronic adverse effects on this attribute. Over the life of the expanded roadway, untreated stormwater would provide a persistent source of contaminants that could be taken up by benthic invertebrates that are forage resources for juvenile Chinook salmon and coho salmon. Prey communities exposed to the various contaminants in stormwater may be reduced in quantity, composition, and quality if they accumulate toxins.

EFH Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the adverse effects of the proposed action on EFH. To reduce adverse impacts from construction-related effects and stormwater pollutants, the FHWA and/or the local recipient of FHWA funds should:

1. Contribute to and support local habitat improvement and enhancement projects within the Lake Washington/Cedar/Sammamish watershed.
2. Employ adaptive management of stormwater treatment to address lack of treatment effectiveness, new science, or contaminants of emerging concern.
3. Develop and implement a regular street sweeping maintenance schedule to remove tire particles and contaminants from the roadway.
4. Participate in a monitoring and reporting program, such as the Washington Department of Ecology Stormwater Action Monitoring (SAM), which monitors stormwater pollutants. The project’s treatment facilities can be proposed to the SAM program as a preferred monitoring location to inform BMP effectiveness.

Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the 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 the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations, the federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

Supplemental Consultation

The 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)).

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The biological opinion will be available through NOAA Institutional Repository. A complete record of this consultation is on file at the Oregon and Washington Coastal Office.

Please direct questions regarding this letter to Elizabeth Babcock in the North Puget Sound Branch of the Oregon Washington Coastal Office at 206-526-4505, or by electronic mail at Elizabeth.Babcock@noaa.gov.

Sincerely,

Kathleen Wells

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