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

Refer to NMFS No:
WCRO-2022-02717

July 20, 2023

William D. Abadie
Chief, Regulatory Branch
U.S. Army Corps of Engineers
211 E 7th Avenue, Suite 105
Eugene, Oregon 97401-2763

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Winchester Water Control District's Winchester Dam Rehabilitation Project, North Umpqua River, Winchester, Douglas County, Oregon (North Umpqua River - HUC6 171003044405) (NWP-2018-505/1)

Dear Mr. Abadie:

Thank you for your letter of March 28, 2022, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the permitting of the Winchester Water Control District's Winchester Dam Rehabilitation project in Winchester, Douglas County, Oregon. The enclosed document contains a biological opinion (opinion) prepared by the NMFS pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the U.S. Army Corps of Engineers (COE) authorizing the issuance of a permit under section 404 of the Clean Water Act. 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 (16 U.S.C. 1855(b)) for this action.

In this document, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Oregon Coast coho salmon (*Oncorhynchus kisutch*) or their critical habitat designated under the ESA. As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth terms and conditions, including reporting requirements, that the Federal action agency must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

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 three conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH.

These conservation recommendations are a subset of the Opinion's incidental 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 EFH conservation recommendation, the Federal action agency 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 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 request that in your statutory reply to the EFH portion of this consultation, you clearly identify if the conservation recommendations are accepted.

Please contact Jeff Young in the Oregon Washington Coastal Office at 541.315.1571 or jeff.young@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely

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

cc: Melanie O'Meara, Corps

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

Winchester Water Control District's Winchester Dam Rehabilitation Project
North Umpqua River, Winchester, Douglas County, Oregon
(NWP-2018-505/1)

NMFS Consultation Number: WCRO-2022-02717

Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?		
Oregon Coast coho salmon (*Oncorhynchus kisutch*)	Threatened	Yes	No		

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

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

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

Date: July 20, 2023

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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.), as amended, and implementing regulations at 50 CFR part 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR part 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 at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at Oregon Washington Coastal Office.

1.2. Consultation History

Pre-consultation with the U.S. Army Corps of Engineers, Portland District (Corps) began on February 23, 2022. The Corps first submitted its proposed permitting of the project for consideration for ESA section 7 coverage under the Standard Local Operating Procedures for Endangered Species to Administer Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES IV In-water Over-water Structures) (NMFS 2012) on March 2, 2022. In March 2022, NMFS reviewed the proposed action and determined that it did not meet SLOPES design criteria or fall within the range of activities covered under the SLOPES opinion and would require an individual formal consultation. The Corps withdrew the project from SLOPES consideration on March 11, 2022. Subsequent to NMFS' determination that the project would not be covered under SLOPES, a series of meetings with the Corps and applicants was established for NMFS to provide technical assistance during the ESA consultation process. NMFS met with the Corps and water control district consultants approximately every other week beginning in May 2022 until August 2022.

On October 20, 2022, we received a biological assessment (BA) and letter from the U.S. Army Corps of Engineers (Corps) requesting formal consultation under section 7 of the ESA for the effects of the Winchester Water Control District's (WWCD) Winchester Dam Rehabilitation on Oregon Coast (OC) coho salmon (*Oncorhynchus kisutch*) and their designated critical habitat. On December 14, 2022, NMFS sent a letter to the Corps stating that the BA did not have sufficient information to initiate formal consultation. On January 2, 2023, NMFS received a letter from the Corps providing our requested additional information. On January 6, 2023, NMFS sent an email stating that the additional information provided in the January 2, 2023, letter was sufficient and initiated formal consultation on January 6, 2023. The Corps supplied NMFS with an updated joint permit application, which included supplemental information about the south spillway gate operations on July 10, 2023, which was considered in our analysis.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 ESA regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910). The proposed action is the Corps' issuance of a permit under section 404 of the Clean Water Act authorizing the WWCD to repair the Winchester Dam on the North Umpqua River in Winchester, Oregon. According to the application, repair activities will consist of the following:

1. **Repair the dam face near the fish ladder to eliminate false attractant flows.** The WWCD will remove an existing log boom and replace a small section of the dam face with new concrete to eliminate the false attractant flow for migrating fish. New concrete will impact approximately 20 square feet below the ordinary high water line. To do this, WWCD will drain Winchester Reservoir by opening the spillway gates on the south side of the dam. Once the lake is drained, this work will take place in the dry.
2. **Repair timber faced portions of the dam**. To support areas of the timber dam that are deteriorating, the WWCD will construct a steel and concrete support structure along the length of the dam. This work will occur on the downstream side of the dam while Winchester Reservoir has been drawn down. The WWCD will isolate the work area with a sandbag and supersack cofferdam and conduct a fish salvage. The water will be pumped to an upland settling basin. The WWCD will then install intermediate vertical steel supports and horizontal steel whalers that tie them together. The WWCD will locate the vertical steel components on repaired concrete sills (on which the existing vertical timber components rest). Along with this repair, some of the existing timber elements may need to be repaired or replaced depending on conditions encountered during construction. The steel and concrete support structure will span the entire approximate 350-foot length of the dam

3. **Fill voids in the existing dam embankment using polyurethane foam**. There are at least six known areas where embankment material has been washed out of the dam creating voids behind the wall face. Additional areas may be identified during construction activities that the WWCD may need to fill. To fill these areas, the WWCD will inject a hydrophobic polyurethane foam below the woodcap or in the existing timbers behind the dam face. Once injected, the proposed polyurethane composite is expected to cure into a strong, dimensionally stable, and water-resistant geo-material.
4. **Arrest subsurface water migration below the southern portion of the dam and south powerhouse**. The WWCD will conduct this work once the south spillway gates are closed and water is again flowing through the fish ladder and over the crest of the dam. The WWCD will install sheet piles to construct a 120-foot long sheet pile wall approximately 18 feet upstream of the south spillway/gate section of the dam and south powerhouse using a template supported with eight 14-inch H-piles. Using a vibratory hammer and an impact hammer to proof the piles, the WWCD will drive the sheet piles into the bedrock to cut off the flow of water. The hammers will be operated from a crane on a barge and will act as a cofferdam while the concrete is placed and cures. Once the coffer dam is sealed, WWCD will pump the water to an upland settling basin and conduct fish salvage. The WWCD will then reconfigure the concrete surfacing in the area to bridge the gap between the dam face and the sheet pile cutoff wall. The sheet piles will then be cutoff even with the surface of the concrete. Care will be taken to cut the piles off so that they are smooth as possible.

Temporary Access Road and Work Platform Construction

Accessing the in-water work areas will require construction of temporary access roads on the north and south banks of the river and a work platform along the length of the dam. Construction of the access roads and work platform would include vegetation removal, minor grading, and installation of aggregate material. Fill (approximately 408 cubic yards) for the access roads and work platforms would temporarily impact 0.25 acre of the upstream and downstream work areas. All aggregate fill would be removed after construction activities are completed.

Water Management

Water levels will be lowered to expose 6 feet below the dam crest elevation (432.8 feet), and temporary isolation will be required for construction activities below the dam. It is anticipated that isolation will consist of sandbags, super-sacks, and plastic sheeting; however, other materials may be used depending on the contractor’s temporary water management design. If required by site conditions, pumps equipped with a fish screen will be installed to pump water out of the isolation area to a temporary water quality facility placed in an upland area on the south bank. Fish salvage will occur within the isolated area as needed before repairs begin.

Conservation measures proposed by WWCD include:

1. Install erosion control devices such as check dams, silt mats, and other erosion and sediment control measures;
2. Minimize clearing and grubbing activities when preparing staging, and construction, to the extent possible. There will be little or no new clearing associated with construction;

3. Select heavy equipment that will have the least possible adverse effect to the environment, considering factors including, but not limited to, equipment that has the ability to conduct work from existing disturbed areas, exert the least soil compaction impact, and minimize the amount of vibration and noise that could disturb aquatic species;
4. Establish staging areas for storage of equipment, project-derived material and supplies as far from the ordinary high-water line as practicable;
5. Locate temporary construction/staging areas within already disturbed/developed areas;
6. Restrict construction vehicles and equipment to roads and designated work areas;
7. Conduct soil-disturbing activities during dry conditions to the greatest extent practicable;
8. To the extent feasible, work with heavy equipment from the top of the riverbank, unless work from another location would result in less habitat disturbance;
9. Periodically monitor the perimeter of the construction zone for wildlife that have inadvertently moved inside exclusion fencing or silt fences. Relocate any identified wildlife to outside the work zone;
10. Remove aggregate and reseed disturbed areas with certified weed-free native seed appropriate to the area;
11. Confirm equipment is clean (e.g., power-washed) and that it does not have fluid leaks prior to contractor mobilization of heavy equipment to site. Inspect equipment and tanks for drips or leaks daily and make necessary repairs within 24 hours;
12. Develop and implement a spill prevention/response plan. In the event of a spill, immediately contain the spill, eliminate the source, and deploy appropriate measures to clean/dispose of spilled materials in accordance with federal, state, and local regulations;
13. Supply portable refueling storage tanks or station equipment containing fuel (i.e., generators or pumps) with portable containment equal to at least 100% of the fuel tanks they contain;
14. Maintain emergency spill control materials, such as oil booms and spill response kits, on-site at each work area, ready for immediate deployment;
15. Isolate in-water work zones prior to any work below Ordinary High Water (OHW). The work area will be isolated from the N. Umpqua River by supersack cofferdams and sheet pile;
16. Dewater work area slowly to minimize turbidity and reduce stress to aquatic organisms;
17. If pumps are needed for dewatering. Outfit the pump with an appropriately sized fish screen;
18. Adhere to seasonal timing restrictions for work below ordinary high water. The IWWP approved by ODFW is July 7 - August 28, with the fish ladder dewatered from August 7 - August 28. If in-water work cannot be completed within the IWWP, then a 1-week extension would be requested as soon as it is determined that an extension is required to complete the scope of work;
19. Make the in-water work zone as small as possible to complete the project;
20. Conduct fish salvage during dewatering and exclude fish from the in-water work zone using block nets or fish-tight turbidity curtains both upstream and downstream;
21. Minimize incidental take due to capture of individual fish during work area isolation and salvage efforts by following NMFS's guidelines for safe fish capture and release, and NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act (NMFS 2000);
22. Do not discharge turbid water to streams. Establish an upland location for discharge of project-derived water (from dewatering, for instance), where water can infiltrate and not return to the stream;
23. All concrete will be placed in the dry and allowed to cure before contact with surface water;

24. Concrete will cure for as long as possible, given construction schedule constraints. In this instance, fresh concrete will cure a minimum of seven days before contact with surface water. During the continuous wet cure, the Contractor shall keep all exposed concrete surfaces saturated with water. Formed concrete surfaces shall be kept in a continuous wet cure by leaving the forms in place for seven days. If forms are removed during the continuous wet cure period, the Contractor shall treat the concrete as an exposed concrete surface. Runoff water shall be collected and disposed of in accordance with all applicable regulations. In no case shall runoff water be allowed to enter any lakes, streams, or other surface waters;
25. A dry work area will be maintained to prevent conveyance of runoff from curing concrete to the North Umpqua;
26. Containment procedures for use in concrete pouring will be included in the SPCC plan;
27. Sheet piles (rather than H-piles) will be used to reduce underwater sound pressure;
28. A vibratory hammer will be used to the extent possible to drive steel piles to minimize noise levels; and
29. The minimum size and weight hammer will be used in proofing the piles into bedrock.

We considered whether or not the proposed action would cause any other activities and determined that it would perpetuate activities that would cause adverse effects on OC coho salmon and their designated critical habitat for an undetermined amount of time beyond the life of the Winchester Dam as it exists today. These activities include:

1. Continued operation and maintenance of the fish ladder to allow fish passage above the Winchester Dam; and
2. Recreational activities including swimming, boating, waterskiing, and fishing in the reservoir above the dam
3. Continued annual operation of the south spillway gates, which could result in increased turbidity during gate openings.

The annual operation of the south spillway gates, as required by OAR 690-020-0250 (2)(f), is planned to coincide with periods of higher flow in the system while background turbidity is naturally elevated, which is between January and March each year. The gates will be opened long enough to ensure a full opening/closing cycle and to complete necessary maintenance and lubrication. The District anticipates this cycling will be a one-time operation each year which will take a total of three to four hours for both gates.

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 to 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 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 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion also relies on the regulatory 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 OC coho salmon use(s) the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the 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 ESA Section 7 implementing regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision 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 range wide 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 critical 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 Species and Critical Habitat

This opinion examines the status of each species that is likely to 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' "reproduction, numbers, or distribution" for the jeopardy analysis. 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 function of the PBFs that are essential for the conservation of the species.

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.

Updated projections of climate change are similar to or greater than previous projections (IPCC WGI, 2021). NMFS is increasingly confident in our projections of changes to freshwater and marine systems because every year brings stronger validation of previous predictions in both physical and biological realms. Retaining and restoring habitat complexity, access to climate refuges (both flow and temperature) and improving growth opportunities in both freshwater and marine environments are strongly advocated in the recent literature (Siegel and Crozier 2020). 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 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).

2.2.1 Status of Critical Habitat

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

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

OC coho salmon Critical Habitat

Critical habitat was designated for OC coho salmon on February 11, 2008 (73 FR 7816). Critical habitat encompasses 13 subbasins in Oregon. The long-term decline in Oregon Coast coho salmon productivity reflects deteriorating conditions in freshwater habitat as well as extensive loss of access to habitats in estuaries and tidal freshwater. Many of the habitat changes resulting from land use practices over the last 150 years that contributed to the ESA-listing of Oregon Coast coho salmon continue to hinder recovery of the populations; changes in the watersheds due to land use practices have weakened natural watershed processes and functions, including loss of connectivity to historical floodplains, wetlands and side channels; reduced riparian area functions (stream temperature regulation, wood recruitment, sediment and nutrient retention); and altered flow and sediment regimes (NMFS 2016, NMFS 2022). Several historical and ongoing land uses have reduced stream capacity and complexity in Oregon coastal streams and lakes through disturbance, road building, splash damming, stream cleaning, and other activities. Beaver removal, combined with loss of large wood in streams, has also led to degraded stream habitat conditions for coho salmon (Stout et al. 2012)

The critical habitat unit the project will occur in is the Lower North Umpqua River fifth-field watershed (HUC5 1710030111). The CHART rated this watershed as having a high conservation value. Key management and issues that have affected critical habitat in this watershed include loss of large wood and forested land cover, impaired riparian vegetation, loss of habitat access due to dams and inadequate culverts, stream channelization and riprapping, wetland draining and filling (for agriculture, grazing, and urbanization), sedimentation, and pollution associated with agriculture/grazing and urbanization. The PBFs of critical habitat that support OC coho salmon in the Lower North Umpqua River Watershed include those for freshwater rearing and migration (Table 1).

Table 1. PBFs of critical habitats designated for OC coho salmon and corresponding species life history events.

Physical and Biological Features Site Type	Physical and Biological Features Site Attributes	Species Life History Events
Freshwater Rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel fry/parr/smolt growth and development
Freshwater Migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration

2.2.2 Status of Species

NMFS first listed OC coho salmon as a threatened species under the ESA in 1998. The species was relisted in 2008 and NMFS re-affirmed the OC coho salmon listing status as threatened on June 20, 2011 (76 FR 35755). We released a recovery plan for this species in 2016 (NMFS 2016). The most recent status review was released in January 2023 (NMFS 2022).

Spatial Structure and Diversity**.** This species includes populations of coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco. The Cow Creek Hatchery Program (South Umpqua population) is included as part of the ESU because the original brood stock was founded from the local, natural origin population and natural origin coho salmon have been incorporated into the brood stock on a regular basis. The OC-TRT identified 56 populations, including 21 independent and 35 dependent populations in five biogeographic strata (Table 2) (Lawson et al. 2007). Independent populations are populations that historically would have had a high likelihood of persisting in isolation from neighboring populations for 100 years and are rated as functionally independent or potentially independent. Dependent populations (D) are populations that historically would not have had a high likelihood of persisting in isolation for 100 years. These populations relied upon periodic immigration from other populations to maintain their abundance (McElhany et al. 2000; Lawson et al. 2007).

Table 2. OC coho salmon populations. Population types included functionally independent (FI), potentially independent (PI) and dependent populations (D) (McElhany et al. 2000; Lawson et al. 2007).

Stratum	Population	Type	Stratum	Population	Type
North Coast	Necanicum River	PI	Mid Coast (Cont.)	Alsea RIver	FI
	Ecola Creek	D		Big Creek (Alsea)	D
	Arch Cape Creek	D		Vingie Creek	D
	Short Sands Creek	D		Yachats River	D
	Nehalem River	FI		Cummins Creek	D
	Spring Creek	D		Bob Creek	D
	Watseco Creek	D		Tenmile Creek	D
	Tillamook Bay	FI		Rock Creek	D
	Netarts Bay	D		Big Creek (Siuslaw)	D

Stratum	Population	Type	Stratum	Population	Type
	Rover Creek	D		China Creek	D
	Sand Creek	D		Cape Creek	D
	Nestucca River	FI		Berry Creek	D
	Neskowin Creek	D		Siuslaw River	FI
Mid-Coast	Salmon River	PI	Lakes	Siltcoos Lake	PI
	Devils Lake	D		Sutton Creek	D
	Siletz River	FI		Tahkenitch Lake	PI
	Schoolhouse Creek	D		Tenmile Lakes	PI
	Fogarty Creek	D	Umpqua	Lower Umpqua River	FI
	Depoe Bay	D		Middle Umpqua River	FI
	Rocky Creek	D		North Umpqua River	FI
	Spencer Creek	D		South Umpqua River	FI
	Wade Creek	D	Mid-South Coast	Threemile Creek	D
	Coal Creek	D		Coos River	FI
	Moolack Creek	D		Coquille River	FI
	Big Creek (Yaquina)	D		Johnson Creek	D
	Yaquina River	FI		Twomile Creek	D
	Theil Creek	D		Floras Creek	PI
	Beaver Creek	PI		Sixes River	PI

Several types of evidence can be used to infer the spatial structure and diversity of coho salmon in this ESU. Taken together, they all indicate that current spatial structure and diversity are similar to previous assessments, or improved in some cases (e.g., reduced hatchery influence). Evidence for spatial structure and diversity is provided indirectly by several criteria in the decision support system (DSS), as well directly from patterns of spawner abundance and productivity across the geographic range of the ESU (Ford 2022). A 2010 BRT (Stout et al. 2012) noted significant improvements in hatchery and harvest practices had been made, although harvest and hatchery reductions have changed the population dynamics of the ESU. Recent re-evaluation of hatchery influence on diversity criteria were positive with even the lowest ranked populations showing improvement since the Stout et al. (2012) assessment (NWFSC 2015). In the 2020 assessment (Ford 2020), the hatchery influence scores indicated the influence of hatchery fish does not adversely affect natural populations in the ESU and trends in the proportion of natural spawners are positive. Additional ESU diversity criteria were not updated in 2015 although the increases in abundance and diversity across all the strata suggest that ESU diversity had not decreased since 2012 (NWFSC 2015). Lewis (2020) reported that population diversity scores in 10 populations were lower than 2015 scores and that scores for the remaining populations increased or remained the same. Diversity can also be inferred from the DSS population sustainability scores as sustainability scores are partially based on population diversity. Mean population sustainability scores in 2020 were less than 2015, but more than those from 2012 (Ford 2022), suggesting a decrease in spatial structure and diversity since 2015.

<u>Abundance and Productivity</u>. The spawner abundance within the Oregon Coast coho salmon ESU varies by time and population. The large populations (abundances >6,000 spawners since 2015) include Nehalem, Tillamook Bay, Alsea, Siuslaw, Lower Umpqua, Coos, and Coquille. The total abundance of spawners within the ESU generally increased between 1999 and 2014, before dropping in 2015 and remaining low. Between the 2015 and 2020 DSS runs, critical abundance scores decreased in half the populations (12 of 21), although the mean score across all populations in 2020 was only 0.01 lower than the mean 2015 score. The number of populations with moderate-to-high certainty that population abundance is maintained above levels where small-population demographic risks are likely to occur went from 15 in 2012 to 18 in both 2015 and 2020.

Population productivity is the natural return ratio of OC coho salmon at low abundances. Between 2012 and 2015, DSS scores for population productivity increased in half the populations (11 of 21). Since 2015, scores for population productivity increased in seven populations, stayed constant in two, and the rest declined. The average score across all populations increased from 0.69 in 2012 to 0.71 in 2015, and then declined to 0.58 in 2020. The number of populations with moderate-to-high certainty that population production at low abundance is sufficient to withstand an extended period of adverse environmental conditions was 19 in both 2012 and 2015, but decreased to 17 populations in 2020.

<u>Biological Risk Summary</u>. Ford (2022) highlights favorable improvements for the OC coho salmon ESU overall and notes the strong role that ocean conditions play on adult returns, including recent low abundance associated with strong marine heatwaves. Ford (2022) also demonstrates the need for continued improvements to freshwater productivity to achieve broad-

sense desired status, especially given the expected challenges posed by climate and ocean change.

The latest ESU scores for persistence (high certainty of ESU persistence) and sustainability (low-to-moderate certainty of ESU sustainability) also demonstrate that the biological status of the ESU has decreased slightly since the 2015 review (high certainty of persistence, moderate certainty of sustainability), which covered a period of favorable ocean conditions and high marine survival rates. However, current ESU scores have improved relative to the 2012 assessment (moderate certainty of persistence, low-to-moderate certainty of sustainability). This improvement occurred despite similar or better abundances and marine survival rates during the earlier period, suggesting continued benefits due to management decisions to reduce both harvest and hatchery releases.

Despite these somewhat optimistic results for Oregon Coast coho salmon, it is unclear what the future will bring. A recent assessment of the vulnerability of ESA-listed salmonid "species" to climate change indicated that Oregon Coast coho salmon had high overall vulnerability, high biological sensitivity and climate exposure, and only moderate adaptive capacity (Crozier et al. 2019a). Because young coho salmon spend a full year in freshwater before ocean entry, the juvenile freshwater stage is considered to be highly vulnerable. They also scored high in sensitivity at the marine stage due to expected changes due to ocean acidification. These results are consistent with the climate change assessment by Wainwright and Weitkamp (2013), which indicated that OC coho salmon will likely be negatively affected by climate change at all stages of the life cycle. Overall, the OC coho salmon ESU is therefore at "moderate-to-low" risk of extinction, with viability largely unchanged from the prior review.

Limiting Factors. Today, Oregon Coast coho salmon are primarily affected by threats that reduce the quantity and quality of coho salmon rearing habitat. Reviews by NMFS' biological review teams in 2011 and 2015 found that the long-term decline in Oregon Coast coho salmon productivity reflected deteriorating conditions in freshwater habitat, and that the remaining habitat may not be high enough to sustain the species productivity during cycles of poor ocean conditions (NWFSC 2015; Stout et al. 2012). Limiting factors of high concern cited in the recovery plan include:

- Reduced amount and complexity of habitat including connected floodplain habitat
- Degraded water quality
- Blocked/impaired fish passage
- Inadequate long-term habitat protection
- Changes in ocean conditions

North Umpqua Population

The North Umpqua Population of OC coho salmon is in the Umpqua stratum of the ESU. This population includes individuals in the North Umpqua River and its tributaries. Until recently, the upstream range of OC coho salmon in the North Umpqua River drainage stopped at Soda Springs Dam. However, fish ladder construction at Soda Springs Dam was completed in November 2012 and OC coho salmon have been confirmed upstream of the dam. Another barrier exists at Slide Creek at approximately River Mile 73. ODFW has maintained and operated a fish counting station at Winchester Dam since 1946. The number of wild adult OC coho salmon spawners returning to Winchester Dam since 1990 is displayed in Figure 1. Spawner abundance of the North Umpqua River population has been variable with the lowest abundances observed in 1990, 1993, 1997, 2007, and 2016 and the highest observed in 1994 and 2010. Overall, since 1990, the North Umpqua population has experienced an increasing trend in spawner abundance.

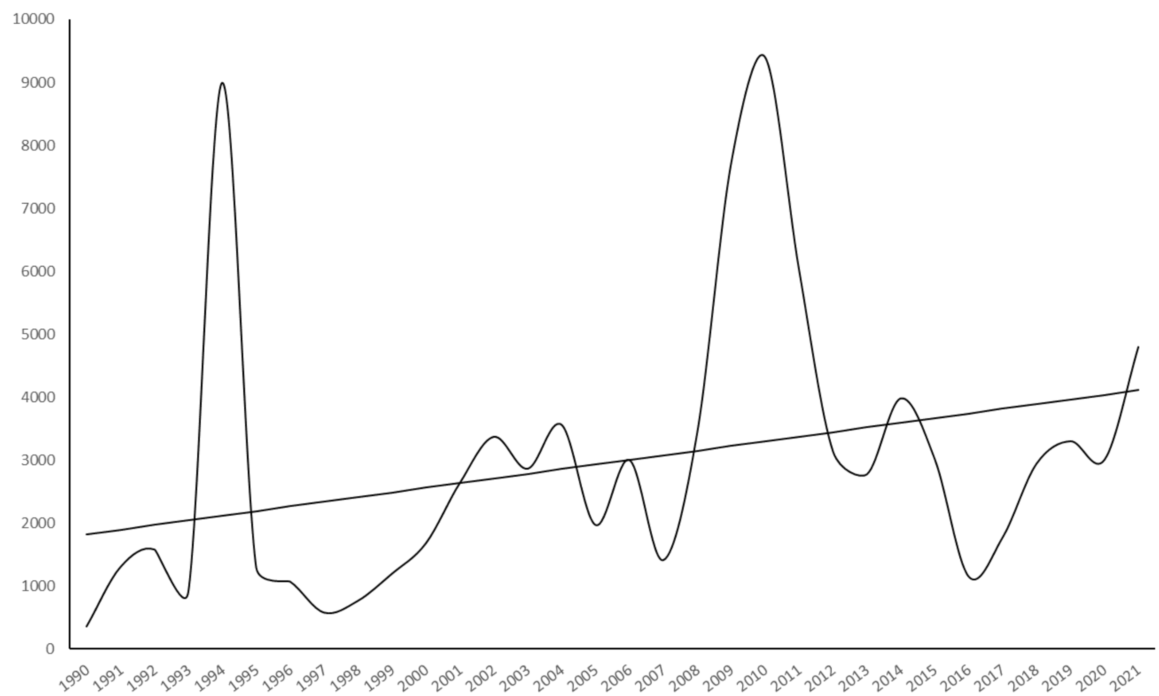

Figure 1. Wild coho salmon spawner abundance in the North Umpqua River population obtained from Winchester Dam counts from 1990 to 2021.

The last three status reviews (Stout et al. 2012, NWFSC 2015, Ford 2022) for OC coho salmon have reported the DSS persistence and sustainability scores for all independent populations, indicating their certainty for persistence and sustainability. Persistence of a population means the population would persist, or not go extinct over a 100-year period, including the ability to survive prolonged periods of adverse environmental conditions. Sustainability means the population's ability to maintain its genetic legacy and long-term adaptive potential for the foreseeable future. Table 3 presents the DSS persistence and sustainability scores for the North Umpqua population of OC coho salmon. Current DSS scores for persistence and sustainability indicate a moderate certainty of persistence and moderate uncertainty the population can sustain its genetic legacy and adaptive potential. Although, since 2012, both persistence and sustainability scores have trended in a positive direction.

Table 3. The DSS persistence and sustainability scores for the North Umpqua River population from the 2012, 2015, and 2022 status reviews.

Year	DSS Persistence Score	DSS Sustainability Score
2012	-0.95	-0.95
2015	-0.30	-0.57
2022	0.52	-.0.41

The primary and secondary limiting factors for the North Umpqua River population of OC coho salmon include stream habitat complexity and water quality and quantity.

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the proposed action includes the bed, banks, and water column of the North Umpqua River in the location of in-water work, as well as areas affected by all other project actions. As such, the action area extends across the entire width of the North Umpqua River and extends 1.45 miles upstream to the first "S" bend which is the upstream extent of the backwater effects of the dam and 1,000 feet downstream. The action area is defined by the likely effects from the reservoir drawdown and the downstream extent of increased suspended sediments from in-water work.

2.4. Environmental Baseline

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

The Lower North Umpqua River watershed comprises 106,395 acres and is the most urbanized watershed in the North Umpqua Basin, with 29 percent of the watershed being non-forested, and an additional seven percent being urban (DOWL 2022). The watershed contains 35.1 miles of the North Umpqua River (Geyer 2003). The Lower North Umpqua is located in the Umpqua Interior Foothills, an ecoregion with narrow interior valleys, broad floodplains, and terraces with gentle to moderate slopes. Elevations are from 500 to 1,000 feet. Precipitation in the ecoregion ranges from 30 to 50 inches.

Key land use management activities that have occurred in the North Umpqua basin between the early 1800's and now that have affected the action area include forest management including logging, splash damming, log drives, and road building; commercial fishing and hatchery operations; urbanization; agriculture; and hydropower dams. These management activities have reduced the condition of aquatic habitat in the action area by altering water quality, water quantity, fish migration, substrate, and habitat complexity.

The climate change effects on the environmental baseline are described in Section 2.2, above. Climate change is likely to play an increasingly important role in determining the abundance of OC coho salmon and the conservation value of designated critical habitats.

While the future existence of the dam is part of the proposed action, the past construction and effects are included here in the environmental baseline, including ongoing effects resulting from physical presence of the dam in its current state, without the proposed repairs. Original construction of the Winchester Dam was completed in 1890 with a powerhouse on the southern abutment. There are two spillway gates at the south abutment between the ogee section and old powerhouse, but they are difficult to operate and only raised to lower the lake for dam repairs. The entire structure is founded on bedrock, with a reinforced concrete sill. The entire structure is founded on bedrock, with a reinforced concrete sill extending the full length under the downstream face of the timber cribbing. The original timber-capped weir has been replaced with a concrete cap for the southerly 202 feet and rebuilt with a timber cap for the remaining 165 feet. The north abutment is a concrete fish ladder and fish viewing building, operated and maintained by the Oregon Department of Fish and Wildlife (ODFW).

In 1969 the property was transferred to the WWCD, which retains ownership. Following its acquisition by WWCD, the old wooden powerhouse on the south abutment and the generation equipment were removed. In 1982 there were repairs to the timber portion of the dam including reinforcement of vertical posts and the addition of plywood to the timber cap on the north side. In 1983 a new concrete powerhouse was built at the north abutment. Their alterations for power generation included a significant upgrade to the fish ladder in 1983, but a fish ladder has been present at the dam since 1923. Power generation at Winchester Dam ended in 1985. Additional repair to both the timber and concrete elements of the dam occurred in Summer 1986. In 1991 the WWCD addressed long-delayed maintenance issues, which had become critical. Holes had formed in the dam, with some reported as large as two square feet in size. About seventy feet of deteriorated wood cribbing was removed and replaced with large wooden timbers. In 1993 the generation equipment in the north powerhouse was removed and sold. Since 1996 on-going repair work to both timber and concrete elements of the dam have occurred periodically to address on-going deterioration. The reservoir was dewatered for repairs in 2005, 2009, and 2013. In September 2013, the powerhouse was filled with crushed rock to address leakage, and repairs were made to the crest of the dam where previously- installed Ultra High Molecular Weight (UHMW) Polyethylene had been damaged. In October 2018, a concrete apron and shallow cutoff wall were installed adjacent to the South Power Building in an attempt to eliminate significant seepage that was occurring under the South Power Building and south spillway gates.

Currently, the Winchester Dam consists of a rock-filled timber crib weir flanked by a concrete fish ladder on the north end and a concrete spillway-powerhouse structure on the south end. The

Oregon Water Resources Department (ORWD) inspects the dam annually and has noted structural deficiencies in the dam. Structural deficiencies noted by ORWD include water is infiltrating the dam, leading to false attraction flows near the fish ladder; some existing timber elements are in poor condition and need repair; voids have developed in the dam embankment, leading to water infiltration; and water is migrating below the southern portion of the dam and south powerhouse. Without the proposed repairs, the dam could eventually fail, leading to significant negative upstream and downstream effects (DOWL 2022).

Critical Habitat in the Action Area

The action area is in the Lower North Umpqua River critical habitat unit (HUC5 1710030111). The PBFs of critical habitat that support OC coho salmon spawning, rearing, and migration in the action area are water quality, water quantity, natural cover, forage, floodplain connectivity, and passage free of artificial construction. The quality and function of the PBFs in the action area have been reduced by the key management activities listed above. The effects on the PBFs are summarized below.

Water quality. This PBF is affected by changes to water temperature and suspended sediments and turbidity. Johnson et al. (1994) reviewed multiple analyses of water temperature in the North Umpqua from 1946 to 1993. Water temperatures showed a clear increasing trend from 1946 to 1968, with less (or no detectable) increase from 1969 to 1993. The sustained increases in river temperatures coincided with a collapse of cutthroat trout numbers crossing Winchester Dam. During August, 7-day average maximum water temperature at Winchester Dam ranged from 67 °F to 72.9 °F in 2017 (the coolest year since 2016); and from 70°F to 75.7 °F in 2021 (the hottest year during that period). Johnson et al. (1994) speculated that temperature increases earlier in the period of record were due to clear-cut logging up until the 1950s. As riparian vegetation recovered, water temperatures moderated somewhat. Cessation of growth in coho salmon has been reported above 68.54 °F (20.3 °C) (Brett 1952, Reiser and Bjornn 1979), which will likely be exceeded during dewatering and work area isolation.

The Umpqua Basin TMDL was approved by the Environmental Protection Agency on April 12, 2007. The TMDL stream temperature modeling of the North Umpqua showed that the seven-day average maximum water temperature exceeded the natural thermal potential by 1 to 3 degrees from Steamboat Creek (river mile 53) to the mouth. The report concluded that the North Umpqua Hydropower Program impacted stream temperatures and therefore the current condition is warmer than the natural thermal potential all the way to the mouth of the river.

DOWL (2022) presented the 7-day average maximum temperature for three years at Winchester dam including the hottest year since 2016 (2021), the coolest year since 2016 (2017), and 2022 to date. During the summer of 2017, water temperatures exceeded 20 °C on all but six days between June 25 and September 2. The highest 7-day average maximum temperature was 24.13 °C in 2017 and 27.39 °C in 2021. The lethal temperature limit for salmonids as a whole is generally considered to be 24°C. Given this assumption, water temperatures at Winchester Dam have exceeded lethal limits during the hottest parts of the year every year since, at least, 2016.

The North Umpqua River is listed as impaired for turbidity on the Oregon Department of Environmental Quality (ODEQ) 303d list from Little River to the confluence with the Umpqua River. This listing is due to data indicating that the level of turbidity was greater than 5 nephelometric turbidity units (NTUs) for greater than 45 days for 10 years. A tributary to the North Umpqua River, Little River (RM 26), is also listed for sedimentation. In 2001, a total maximum daily load (TMDL) was established on Little River and Cavitt Creek for sedimentation. The TMDL cited excessive amounts of fine sediment being delivered to streams from increased slope failure rates on lands associated with past timber harvests (ODEQ 2006).

In February 2023, the water control district operated the south spillway gates of the dam releasing a visible sediment plume. The gates were operated as part of general maintenance activities in addition to ensuring functionality in preparation for the dam maintenance described under the proposed action. The amount of sediment mobilized during this gate exercise is unknown. In a multi-agency meeting held on June 9, 2023, the water control district was instructed to coordinate future gate openings with Oregon Department of Environmental Quality, NMFS, ODFW, and the Corps to ensure harm to trust resources is minimized and all necessary permits, environmental reviews, and sediment testing are obtained prior to gate operation. No party asked to consult with NMFS prior to the February 2023 gate operation, nor was it included in the proposed action. The operation was conducted without NMFS coordination or knowledge. NMFS does not provide after-the-fact ESA section 7 take coverage. NMFS understands the south spillway gates will continue to be operated on an annual basis to assess functionality.

Two streams and/or their associated reservoirs in the North Umpqua sub-basin are 303d listed for chemical contaminants or nutrients. Cooper Creek Reservoir is 303(d) listed for the contaminants and nutrients iron and mercury. Cooper Creek is a tributary of Sutherlin Creek, which is listed arsenic, biodiversity, copper, and iron. Being a tributary of the North Umpqua River, Sutherlin Creek likely discharges these contaminants and nutrients into the North Umpqua River, but its confluence is downstream of the action area. Furthermore, the North Umpqua River is not 303(d) listed for chemical contaminants or nutrients in the action area.

Based on this information, management activities described above resulted in increased water temperature and suspended sediments and turbidity have reduced the quality and function of the water quality PBF in the action area to support spawning, rearing, and migration of OC coho salmon.

Water quantity. Annual flows in the North Umpqua at Winchester are lowest from early July through October, and the highest flows occur in December and January. The upstream dams of the NUHP influence flows in the North Umpqua River, but primarily in bypass reaches (river reaches around which water is diverted for power generation). Farther down in the system, at Winchester Dam for instance, these changes are likely not significant, if they are detectable at all.

At Winchester Dam, natural river flow is modified by the impounding of water for storage upstream of the dam. Water in the reservoir is stored on the surface and in the substrate that has aggraded behind the dam. The impounding of water has slowed the flow velocity and increased the surface area of the river in the reservoir. Previous repairs to the dam have reduced water quantity in the reservoir and increased water quantity downstream of the dam for short time periods (days to weeks). These changes affect only the lower seven river miles of the North Umpqua River and it is unlikely that the briefly increased flow would be biologically significant downstream of the confluence of the North and South Umpqua Rivers.

Water quantity in the action area has also been affected by water withdrawals related to water rights. There are approximately 451 water right permits or certificates that have been issued in the action area by the Oregon Water Resources Department.[1] Water right uses include but are not limited to domestic, storage (reservoir, ponds, etc.), irrigation, municipal, and commercial.

Based on recent communications between the applicant and the Oregon Water Resources Department (OWRD), it appears that the Winchester Water Control District is allowed to store 300-acre feet in the reservoir behind the dam per their existing water right. Currently, the water control district stores slightly more than their water right. At this storage amount the fish ladder is operational to pass fish as it is described in the discussion of the passage free of artificial PBF below. Based on the recommendation of OWRD, the water control district has applied to amend their existing registration statement to allow for the current amount of storage, which would allow the district to maintain fish passage as it currently functions.[2]

Based on this information, all the water management activities described above have resulted in modifications to water quantity in the action area, reduced the quality and function of the water quality PBF in the action area to support spawning, rearing, and migration of OC coho salmon.

Natural cover. High quality natural cover habitat in streams is associated with large boulders and cobbles and large woody debris that provide channel roughness; scour pools and off channel habitat with large wood that provide rearing habitat for foraging and predator avoidance, and vegetated streambanks that contain large wood. Natural cover in the action area has been degraded by management activities including dam construction, water storage, water withdrawals, and shoreline development and armoring. Dam construction and water storage typically results in simplifying salmonid habitat in streams and rivers. The reservoir that resulted from the Winchester Dam has a uniform bottom that is mostly void of boulders and large wood. River banks are simplified by shoreline development where residential properties have large manicured lawns, riprap and other

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[1] Oregon Water Resources Department Water Rights Mapping Tool. Available at: https://apps.wrd.state.or.us/apps/gis/wr/Default.aspx. Accessed 4/12/2023.

[2] It is impractical for NMFS to assume a scenario where the amendment is rejected and the fish ladder rendered inoperable, for lack of information about this scenario and because that does not appear likely to occur, based on OWRD's communications. However, if the amendment were rejected and the district ordered to reduce the storage to a level incompatible with operation of the fish ladder, the impacts to threatened salmonids would likely exceed those analyzed in this Opinion and necessitate a change to the action, reinitiation of consultation, and other considerations.

bank revetment materials, and boat ramps and streambanks are mostly void of large woody debris and vegetation.

Based on this information, management activities described above resulted in modifications to natural cover in the action area, and have reduced the quality and function of the natural cover PBF in the action area to support spawning, rearing, and migration of OC coho salmon.

Forage. The impoundment of water and aggradation of sediment by Winchester Dam has likely caused a shift from stream-oriented aquatic invertebrates to lake-oriented invertebrates (Stanley et al. 2002). This is likely due to the change of habitat in the action area from river/stream type riffle habitat to slow velocity and deeper reservoir habitat with high amounts of fine sediments and organic material. Increased sedimentation can fill pools thereby reducing the amount of potential cover and habitat available, and smother coarse substrate particles which can impair macroinvertebrate composition and abundance (Sigler et al. 1984; Alexander and Hansen 1986).

Land management activities including water withdrawals associated with water rights, shoreline development, periodic dewatering of the reservoir for dam maintenance, and streambank stabilization and simplification have likely contributed to changes in the species and abundance of aquatic invertebrates that occupy the action area, too. Shoreline development and streambank stabilization and simplification have reduced streamside vegetation, which is habitat for the adult life stage of aquatic invertebrates. While these management activities have reduced abundance of forage for OC coho salmon in the action area, these abundance reductions have been primarily associated with dewatering events for dam maintenance and have been short-term only lasting weeks to months as forage species have quickly recolonized the action area following re-filling of the reservoir. Longer term reductions in forage abundance are due to habitat impacts from sedimentation in the reservoir, shoreline development, water withdrawals, and streambank stabilization and simplification. Based on this information, land management activities in the action area have reduced the quality and function of the forage PBF in the action area to support rearing and migration of OC coho salmon.

Floodplain connectivity. Land management activities including dam construction, streambank stabilization, and water withdrawals have modified the floodplain and reduced connectivity and access to the floodplain. The Winchester Dam alters the water regime of riverine wetlands associated with the North Umpqua River for a length of approximately one mile. These activities have reduced the quality and function of the floodplain connectivity PBF in the action area to support rearing of OC coho salmon in the action area.

Passage free of artificial obstruction. In the action area on the North Umpqua River the Winchester Dam is the only obstruction to fish passage and construction was completed on the dam in 1904. Following completion, there was no fish ladder at Winchester Dam, but between its construction in the 1890s and 1907, fish could reportedly pass upstream during high flows (LovellFord et al. 2020). In 1907, the dam was raised from its original height of four feet to a height of 16 feet (LovellFord et al. 2020) and was a complete barrier to fish passage except perhaps at the very highest discharges and until construction of the initial ladder 1923. In 1984, the fish ladder was upgraded with the construction of a second entrance. Unspecified upgrades were also made to the fish ladder in 1992 (Loomis and Anglin, 1992) and a lamprey ramp was added to the fish ladder in 2013.[3] Although minor upgrades and maintenance have been conducted on the fish ladder, the fundamental operation of the fish ladder has not changed since 1984.

The status of fish passage at Winchester Dam has changed since construction of the fish ladder from a complete barrier to passage to providing passage for multiple species of fish today. The ODFW actively manipulates the fish ladder by installing and removing flash boards to optimize fish passage, attempting to balance attraction flows that are adequate during low water periods to attract fish to the fish ladder entrance and water velocities through the ladder that are navigable for adult salmonids during high discharges.[4] Currently, the fish ladder provides upstream passage to adult salmonids, largescale suckers, Umpqua pikeminnow, and Pacific lamprey. However, leaks in the dam have created false attraction flow which may interfere with fish using the current side ladder entrance, likely delaying passage of some adult salmonids for some period of time (DOWL 2022). Although, there are no studies or data that would quantify the current delay in fish accessing and passing through the ladder. Downstream passage occurs through the fish ladder or over the crest of the dam, which includes a freefall of approximately 15 feet to the river below. Juvenile coho salmon are likely unable to migrate upstream through the fish ladder because of its design and flow conditions in the ladder.

Based on this information, dam construction has reduced the quality and function of the fish passage free of artificial obstruction PBF in the action area. However, the fish ladder does function to support upstream adult OC coho salmon passage and juvenile OC coho salmon downstream passage and migration in the action area. Although, some adult coho salmon may experience short-term (days to weeks) migration delays due to the false attraction flows at the dam.

Species in the Action Area

The action area is occupied by adult and juvenile OC coho salmon that use the action area for spawning, rearing, and migration. Rearing juvenile OC coho salmon are present in the action area year around, although high water temperatures limit rearing in the action area during the summer. The highest numbers of juvenile OC coho salmon rearing and migrating in the action area likely occurs during the winter and spring. Rearing in the reservoir above the dam primarily occurs in the winter and spring before water temperatures increase cause rearing OC coho salmon to seek cold water refuge upstream.

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[3] News release, Oregon Department of Fish and Wildlife, available at: https://www.dfw.state.or.us/news/2013/june/060613b.asp. Accessed April 21, 2023.

[4] DOWL personal communication with Greg Huchko, ODFW Umpqua District Fish Biologist; reporting on ODFW water management for the Winchester Dam fish ladder (June 4, 2022) (DOWL 2022).

OC coho salmon smolts migrate through the action area to the ocean beginning in March through the end of June, with peak migration occurring in April and May.

Previously mentioned land and waterway management activities have degraded aquatic habitat important for the growth, survival, and fitness of OC coho salmon in the action area. As a result, OC coho salmon in the action area have been adversely affected by the degraded condition of aquatic habitat. The response of these species is not immediately apparent, but can be observed in individuals' reduced growth, survival, and fitness, and overall abundance over the long-term in the action area. While the habitat in the action area is degraded, it does provide support for OC coho salmon rearing and migration.

As described above, weaknesses in the dam have allowed leaks and created false attraction flow in areas from the base of the dam face and next to the fish ladder. Because of this, some migrating adult salmonids encounter the dam before the fish ladder and make attempts to jump at the dam and land on the concrete sill or bedrock at the base of the dam. Adults that do this could experience external physical injury, or internal injury, which could injure eggs in females. Observations of this adult salmonid behavior at the dam have been observed during the migration period of OC coho salmon.[5] Migrating adult OC coho salmon may also experience injury in the fish ladder. The ODFW has sporadically observed adult OC coho salmon with apparent fresh gashes on their sides at the video counting station that could potentially be due to exposed rebar in the fish ladder.[6]

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). 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 the factors set forth in 50 CFR 402.17(a) and (b).

As described in the environmental baseline, structural deficiencies in the dam have been noted by ORWD during annual inspections and without the proposed repairs, the dam could eventually fail (DOWL 2022). Repairs to the dam include supplementing the concrete sill with additional concrete, constructing a permanent sheet pile wall upstream of the south spillway gate section of the dam and south powerhouse, installing new concrete in a small dam section near the fish ladder, repairing and replacing portions of the timber crib structure, filling voids behind the dam wall face using polyurethane foam, and constructing the vertical steel support and horizontal steel whaler structure on the concrete sill immediately downstream of the timber crib structure. These activities are intended to repair Winchester Dam to prevent its further degradation and failure and extend its useful service life to support the uses of the upstream reservoir,

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[5] Email from Jeff Dose (Steamboaters) to Lance Kruzic (NMFS) reporting on observations of fish behavior at Winchester Dam. Received November 9, 2022.

[6] DOWL personal communication with Greg Huchko, ODFW Umpqua District Fish Biologist; reporting on ODFW observations of adult coho salmon at the fish counting station at Winchester Dam (June 4, 2022) (DOWL 2022).

consequently, perpetuating the dam's effects on OC coho salmon and their designated critical habitat into the future beyond its current useful service life.

2.5.1 Effects on Critical Habitat

The proposed action's activities include dewatering of the reservoir, work area isolation and fish salvage, repairs to the internal timber crib dam structure, construction of a steel support structure along the dam face, concrete work to repair a small section of the dam face near the fish ladder and the concrete sill, injection of polyurethane foam into the timber crib structure, installation of sheet pile with a vibratory hammer and proofing with an impact hammer, and construction of temporary access roads and a work platform. The PBFs in the action area exposed to the proposed action include water quality, water quantity, forage, natural cover, floodplain connectivity, and fish passage free of artificial obstruction. Effects from the proposed action on critical habitat PBFs include reduced water quality from increased suspended sediments and chemical contaminants, reduced water quantity from dewatering of the reservoir and work isolation areas, reduced substrate function due to effects on sediment transport processes, delayed fish passage, and reduction in forage abundance.

Water Quality

Suspended sediment. The water quality PBF is adversely affected when water quality parameters such as suspended sediments reach levels or concentrations that modify normal behaviors of OC coho salmon individuals. Turbidity is a measure of the amount of suspended solids in water and is measured in nephlometric turbidity units (NTUs). Turbidity concentrations as low as 20 and 30 NTUs for 4 hours or more alter territorial behavior and increase gill flaring of juvenile coho salmon (Berg and Northcote 1985). By comparison, ODWQ turbidity monitoring criteria call for the implementation of BMPs once turbidity exceed 10% over background levels.

Construction activities including operation of the gates to achieve drawdown elevation, cutoff wall/cofferdam installation, removal of aggregate from temporary road and staging areas, and heavy equipment usage on the bank are likely to temporarily increase concentrations of suspended sediments in the action area. Short-term pulses of sediment are likely to occur during installation of the sheet pile wall, installation and removal of cofferdams, and when in-water work areas are re-inundated. The substrate at the fish ladder work location is bedrock, which would unlikely result in suspended sediment increases when it is rewatered. Therefore, increases in suspended sediment at or above a turbidity concentration of 30 NTUs from these activities at the fish ladder work location are expected to be short-term (less than 4 hours) and unlikely to adversely affect water quality in the action area.

Cofferdam installation and removal are likely to increase suspended sediments causing an increase in turbidity in the action area immediately below the work isolation areas. During the low flow period of October through early November 2018, background turbidity measured in the action area at or around 2 NTUs.[7] During this period, dam repair activities, including cofferdam installation and removal, conducted by WWCD and their contractor resulted in turbidity

[7] Enclosure (ODEQ Notice of Civil Penalty Assessment and Order, Case No.: WQ/NP-WR-2019-231) to letter from ODEQ to Basco Logging, Inc. January 27, 2020.

increases exceeding 10 NTUs on 9 days in October and 4 days in November 2018. During a previous construction event on October 15, 2018, dam repair activities caused turbidity of 155 NTUs (7,650 percent increase over background) and a visible turbidity plume, extending approximately 600 feet downstream.[6] Based on this event, NMFS anticipates, dam repair activities, including cofferdam installation and removal will likely adversely affect the quality and function of the water quality PBF in the action area during the construction period.

Dewatering the reservoir will occur slowly over several days and the south spillway gates will remain open for approximately three weeks as repairs to the dam face and the north side of the dam are completed. Dewatering the reservoir will release sediment stored in the reservoir, but it is unknown how much sediment would be released. NMFS was unable to find documentation of the amounts of composition of sediment sizes in the reservoir, but photos of previous drawdowns indicate it consists of large and small cobble, gravel, sand, and fine sediment. Because the amount of fine sediment in the sediments stored in the reservoir is unknown, we will conservatively assume that it will at times be high enough to exceed the 10% above natural stream turbidities NTU threshold for a duration of four hours or more that would adversely affect water quality in the action area; and is also trigger implementation of ODEQ turbidity monitoring BMPs when met; such as, work stoppage and implementation of BMPs outlined in the terms and conditions section of this Opinion. The highest concentrations of turbidity from suspended sediments would occur during the first hours to days of the reservoir drawdown lasting for up to several days. Turbidity concentrations will dissipate as they are transported downstream. Suspended sediments that increase turbidity can travel long distances downstream, sometimes even miles, but this is dependent on sediment size and angularity, water velocities, stream size, stream channel morphology, and stream channel roughness. Downstream of the dam and the influence of the dam on water flow and velocity habitat features include long deep pools and pockets that slow water velocities. Thus, the turbidity plume will likely extend up to approximately 1,000 feet downstream of the dam and disperse across the channel as it flows downstream. However, the part of the plume that exceeds 10% above background turbidity for 4 hours or more would extend downstream for a lesser distance of approximately 600 feet and extend approximately 80 feet into the channel from the south river bank. It is within this area that suspended sediment will adversely affect the quality and function of the water quality PBF for up to several days.

The annual operation of the gates, as required by OAR 690-020-0250 (2)(f), is planned to coincide with periods of higher flow in the system while background turbidity is naturally elevated, which is between January and March each year. The gates will be opened long enough to ensure a full opening/closing cycle and to complete necessary maintenance and lubrication. The District anticipates this cycling will take three to four hours for both gates. During the gate openings there is a potential for sediment to become suspended and to be flushed through the gates downstream. Turbidity that results from the gate openings will need to be monitored and controlled according to DEQ turbidity monitoring criteria, see Terms and Conditions of this Opinion. With these controls implemented, harm to critical habitat should be minimized; however, any sediment that transported by a gate opening event would likely be dispersed downstream where it will eventually fall out of suspension. Sediment transport of this nature, is not likely to be significant enough to appreciably reduce habitat or habitat functionality within the action area.

Water temperature. Small surface release dams show high variability in how they affect downstream thermal characteristics (Zaidel et al. 2021). Downstream thermal responses caused by small surface release dams vary from downstream warming (Ward and Stanford 1979), little to no effect on downstream temperatures (Lessard and Hayes 2003, Saila et al. 2005) and, in some cases, downstream cooling (Zaidel et al. 2021).

Studies and data collection on the North Umpqua River and Winchester Dam reservoir in the action area are limited. The best data that is available indicates a warming trend in water temperatures throughout the action area, but it is difficult to determine what effect the reservoir may have on downstream water temperature. Data from the Partnership for Umpqua Rivers (PUR) compares water temperatures taken at four locations including North Umpqua at Whistler's Bend (15 miles upstream), the North Umpqua at Echo Drive (9 miles upstream), the Interstate 5 bridge just downstream of Winchester Dam, and the North Umpqua at Hestness Landing (3.5 miles downstream of bridge).[8] The river reaches between Whistler's Bend and Echo Drive and the Interstate 5 bridge and Hestness Landing are free flowing reaches without obstructions to water flow that would result in water storage (reservoir). The differences in water temperature in the river during the summer months between Whistler's Bend and Echo Drive averaged 0.92 °F (range 0.1 to 1.4 °F), with an increase of 0.15 °F per mile. The differences in water temperature during the summer months (June to September) in the river at Echo Drive downstream to the Interstate 5 bridge below the dam (including the Winchester Dam reservoir) averaged 1.78 °F (range -1.7 to 2.5 °F), with an increase of 0.2 °F per mile. The differences in water temperature from Interstate 5 bridge to Hestness Landing averaged 0.84 °F, with an increase of 0.24 °F per mile. Converse to the heating trend, one study indicated that the reservoir has a cooling effect on the river in the action area. An infrared aerial survey of surface water temperatures done for the ODEQ in July 2002 suggested that water temperature decreases from the upstream point to the downstream point by approximately 1.44 °F (Watershed Sciences, 2003).

It is difficult to determine how the dam and reservoir affect water temperature in the North Umpqua River, but the best available data indicates that any effect is likely minor and not meaningful since the increase in the reach of the river containing the reservoir is within the upper and minimum bounds of the upstream and downstream free-flowing reaches. Based on these data, the proposed action will not meaningfully change water temperature in the action area such that the quality and function of the water quality PBF would be reduced in the action area. In the long-term, the effects of extending the useful life of the dam are also not likely to change the water quality PBF in the action area.

Chemical contaminants. The reservoir formed behind Winchester dam is surrounded by residential space and is used for recreational purposes. It is possible that chemical inputs from lawn fertilizer, herbicides, pesticides, and watercraft related chemicals are present within the reservoir sediments. However, the sediment has not been subject to testing since the dam's construction, making it difficult to determine whether these chemicals could be present in detectable levels. Given the age of the dam and reservoir uses, it is reasonable to assume some level of chemical constituents are likely present in the reservoir sediment. No assumption about

[8] Data obtained from ODEQ on June 7, 2023, available at: https://orwater.oregon.gov/Login.aspx

the adverse effect on critical habitat; however, can be made at this time due to the lack of data. The proposed action may add to existing baseline sediment condition through potential hydraulic leaks, or gas or oil spills that may result from use of large equipment used to carry out the dam repair; however, given the containment BMPs to be implemented and other safeguards against such events, NMFS considers that risk small. The synthetic materials used to repair the dam will be encapsulated in areas where it would otherwise come into contact with water; therefore, the risk of chemical input from those materials is also likely to be minimal.

Uncured or partially-cured concrete can leach hydroxyl ions into surrounding waters raising the pH. Law et al., (2013) found that increased pH was primarily a concern in areas where the volume of water and rate of flow are relatively low such as culverts in small streams. In confined areas with small volumes of water, the pH can increase to levels toxic to fish. The effects of uncured concrete in larger natural systems is poorly studied (CTC and Associates, LLC. 2016), and few agencies have guidelines for appropriate curing times before ambient water comes in contact with recently placed concrete (CTC and Associates, LLC, 2016). However, a green concrete discharge in the action area in 2018 resulted in a plume extending approximately 1,740 feet downstream and adverse effects on the water quality PBF.[9]

Conservation measures proposed by WWCD for concrete work include curing of concrete for three days prior to exposure to ambient water, washing the concrete within the isolated work area and pumping this water to an upland infiltration basin, and establishing concrete truck chute areas to properly contain wet concrete and wash water to prevent it from entering wetlands and waterbodies. The Washington Department of Transportation Standard Specification for Road, Bridge, and Municipal Construction (WSDOT 2022) requires a continuous wet cure for a minimum of three days, and states,

> "contractor shall keep all exposed concrete surfaces saturated with water. Formed concrete surfaces shall be kept in a continuous wet cure by leaving the forms in place. If forms are removed during the continuous wet curing period, the Contractor shall treat the concrete as an exposed concrete surface. Runoff water shall be collected and disposed of in accordance with all applicable regulations. In no case shall runoff water be allowed to enter any lakes, streams, or other surface waters."

Because the risk of water quality effects is minimal or conservation measures proposed to minimize effects of the proposed action on water quality, NMFS does not anticipate adverse effects from chemicals associated with the proposed action to adversely impact critical habitat.

Water Quantity

The dam acts to store water in the reservoir, but the dam is a run of the river dam which does not prohibit flow over the dam and downstream. Dewatering of the reservoir will adversely affect the water quantity PBF in this portion of the action area because this will result in the loss of resources that OC coho salmon require for growth and development and a large reduction in

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[9] Enclosure (ODEQ Notice of Civil Penalty Assessment and Order, Case No.: WQ/NP-WR-2019-231) to letter from ODEQ to Basco Logging, Inc. January 27, 2020.

available habitat in the reservoir. This will reduce the quality and function of the water quantity PBF for as long as the reservoir is dewatered (three weeks).

The Winchester Water Control District is allowed to store 300-acre feet in the reservoir behind the dam. Currently, the water control district stores slightly more than their water right, which allows the fish ladder to function throughout the year. The District has applied to the Oregon Water Resources Department to amend their existing registration statement to allow for the current amount of storage, which would maintain functionality of the fish ladder throughout the year, as it currently functions. As noted above, if the water control district were to only refill the reservoir to their authorized storage limit, the functionality of the ladder to allow fish passage during low water periods would likely be reduced and flow would be concentrated through the south spillway gates on the opposite end of the dam creating a significant false attractant issue throughout the year, which could harm migrating adult OC coho salmon that try to pass in this inappropriate location. However, as noted above, for the purposes of this consultation NMFS assumes the District will refill the reservoir to an elevation necessary to maintain functionality of the fish ladder throughout the year, as it currently functions. Assuming the reservoir will be refilled to the current reservoir elevation after construction is complete, the dam's continued presence and operation in run-of-river mode will not reduce water quantity.

Forage

In the winter the North Umpqua River, including upstream and downstream of the Winchester Dam, juvenile OC coho are known to consistently rear, indicating some suitable level of nutrient presence for forage. Forage is a PBF considered an essential element of critical habitat for juvenile OC coho development. The proposed action includes a three-week drawdown to dewater the dam and work area isolation during which times the few rearing juveniles that are present in the summer would not be able to access nutrients to which they would normally have available. This would likely last for months until juvenile OC coho salmon forage species recolonize the dewatered and work isolation areas.

Natural Cover

Natural cover such as summer shade, submerged and overhanging large wood, log jams, beaver dams and ponds, aquatic vegetation, large rock and boulders, side channels, and undercut banks are all necessary to support freshwater rearing sites (NMFS 2016). Stream complexity is a primary limiting factor for recovery success of the North Umpqua population in the Umpqua Stratum (NMFS 2016). The continued presence of the dam will continue the baseline condition which is dominated by lack of stream complexity within the action area. The areas immediately upstream of the dam do not contain high volumes of natural cover as the reservoir shoreline has been anthropogenically de-vegetated over the many years the dam has been in place to maintain the residential development that exist along the banks today. Though the reservoir is currently dominated by the persistent presence of Eurasian Water Milfoil (Personal communication, Ryan Beckley, June 9, 2023), the invasive species is not considered a favorable attribute or significant source of natural cover for rearing juvenile OC coho, and may crowd out beneficial vegetation needed by rearing juveniles. The proposed action is not likely to exacerbate the Water Milfoil issue present within the reservoir, but it is unlikely to reduce its overall impact either. Though the reservoir will be drawn down to levels that will expose large areas of Water Milfoil, disturbing the aquatic plant using mechanical removal could perpetuate additional growth and may unnecessarily disturb sediments holding lamprey ammocetes (Personal communication, Ryan Beckley, June 9, 2023). Small areas of natural cover are more likely to be present downstream of the dam, and those locations may be impacted during the drawdown due increased flows during a typically low water time of year. Because the reservoir will be drawn down gradually, these effects are likely to be minimal if detectable at all. In the long-term, maintaining the presence of the dam will extend the current baseline condition of minimal natural cover due to continued holding back of woody material and gravel substrate that would otherwise naturally accumulate within the downstream reach of the action area.

Floodplain Connectivity and Stream Complexity

The proposed action will not increase or detract from the current state of limited floodplain connectivity in the action area. The dam will be repaired, the short-term effects of which are not related to floodplain connectivity. However, the long-term effect on this PBF will continue the current lack of floodplain connectivity and lack of stream complexity. The dam, along with development within the action area has reduced input of large wood into the river and likely prevents natural gravel dispersal downstream of the project site. Both of these elements would typically contribute to stream complexity and will continue to be suppressed with the continued presence of the dam. Additionally, the dam, and surrounding urbanization of the action area, prevents natural channel migration processes and floodplain connection that would otherwise occur. This situation would persist under the proposed action.

Passage free of artificial obstruction.

Currently, the fish ladder provides upstream passage to adult salmonids and downstream passage for juveniles; however, leaks in the dam have previously and currently created false attraction flow which may interfere with fish using the current side ladder entrance, likely delaying passage of some adult salmonids for some period of time (DOWL 2022). The proposed action will eliminate passage through the fish ladder for the three weeks it will be dewatered. Additionally, any juveniles that may be present would not be able to pass downstream over the dam face during that time. The long-term effects of the proposed action may reduce harm to adult OC coho that use the ladder to migrate upstream because the leaks in the dam will be fix to eliminate false attraction of adult fish to inappropriate passage locations on the dam, and the ladder will be improved to smooth out rough edges that could be the cause of fish injury. The proposed action will ensure the continued existence of the dam, which overall has reduced the quality and function of the fish passage free of artificial obstruction PBF in the action area, compared to an alternative where, without the repairs, the dam is eventually removed. Assuming the District refills the reservoir to the level necessary to operate the fish ladder year-round, the fish ladder will continue to function to support upstream adult OC coho salmon passage and juvenile OC coho salmon downstream passage and migration in the action area.

2.5.2 Effects on Listed Species

Short-term Effects

Short-term effects are those generally present during active staging, construction, and demobilization/shakedown. Short-term effects resulting from the proposed action may take the form of direct harm, injury, disturbance, harassment, or even morality. These effects are detailed below and characterized according to each activity included in the proposed action.

Dewatering/Work Area Isolation, Fish Salvage, Fish Passage

Work area isolation and fish salvage. To remove the log boom and replace the small section of the dam face with new concrete near the fish ladder, the WWCD will dewater the reservoir by opening the spillway gates at the south side of the dam. The WWCD will use sandbags, super-sacks, and plastic sheeting along the dam face to isolate the work area from the river for construction of the steel support structure and concrete apron at the foot of the dam. To conduct repairs at the south spillway gates, the WWCD will construct a sheet pile wall approximately 18 feet upstream of the south spillway gates. Work area isolation will result in capture of juvenile OC coho salmon in the isolation areas and fish salvage will occur to remove fish from the isolated work areas. Fish salvage will occur at the north isolation area (4,440 square feet) the first week of construction, and in the sheet pile cutoff wall (2,200 square feet) in late August, given current project schedules.

Fish exposed to capture and handling during salvage exhibit stress responses including increased cortisol and glucose (Frisch and Anderson 2000; Hemre and Krogdahl 1996), physiochemical imbalance, disrupted osmoregulatory functions and normal behavior (Snyder 2003), and disorientation resulting in reduced predator avoidance (Olla *et al*. 1998). The OC coho salmon juveniles captured and handled will experience these sublethal and lethal adverse effects and up to two percent will be injured or killed by isolation and fish salvage.

There is no data that describes juvenile coho salmon rearing density in the action area (DOWL 2022). During the mid-July to mid-September in-water work window, the previous year's juvenile OC coho salmon are expected to have migrated downstream past Winchester Dam (with peak outmigration in April and May) while the juveniles from the winter/spring of that year will be rearing higher up in the watershed in their natal streams. Some juvenile OC coho salmon that were produced near Winchester Reservoir, or driven out of upstream rearing habitats, may rear in the areas of work area isolation, but summer water temperatures above 20°C likely severely limit late-summer juvenile coho salmon rearing. Depending on conditions during isolation, it may not be possible to capture and relocate all of the individual fish within the isolated in-water work areas.

Accurately estimating the number of juvenile OC coho salmon potentially affected by any in-water work is difficult without data on juvenile OC coho salmon rearing densities in the action area. However, during snorkel surveys of the Umpqua basin from 2011 to 2021, the density of OC coho salmon juveniles in surveyed habitats ranged from 0.203 fish per square meter (m^2) (in 2021) to 0.498 fish/m^2 (in 2013). The mean density was 0.287 fish/m^2 (0.027 fish/SF) (Constable and Suring, 2022). These surveys were conducted in smaller streams with much more favorable habitat for juvenile rearing OC coho salmon than in the action area. If the mean 10-year density were to occur in the isolated salvage areas, 147 OC Coho would be present and require salvage. Assuming 2 percent mortality due to work area isolation and salvage, approximately three juvenile OC coho salmon will be killed by work area isolation and salvage. This magnitude of this one-time effect is extremely small relative to overall abundance and is not substantial enough to cause a decrease in abundance at the population or ESU level.

Fish passage and ladder improvements. During construction on the south side of the dam to repair the south spillway gates, the fish ladder will be shut down for three weeks during August and no upstream or downstream passage will occur during this period. Effects of delayed passage on salmon adults ranges from delay in migration and spawning to pre-spawn mortality. The earliest OC coho salmon adults have shown up at Winchester Dam has been during the 2-week period of August 16th to the 30th. From 2002 through 2014 the number of adults passing through the ladder at Winchester dam ranged from 0 to 2 adults. After 2014, the ODFW began monitoring and counting adult salmonid passage for only 200 days a year and no longer provided counts of coho salmon adults during August. Between 2002 and 2014, spawner abundance ranged from 1,410 to 9,397 and even in the higher abundance years the number of adults that passed the ladder was no more than two. Thus, up to two adult OC coho salmon may experience delayed passage through the ladder during construction, which is less than 0.18 percent of the lowest abundance (1,148 in 2016) of adult coho salmon for the North Umpqua population since 2002.

Adult coho salmon have been observed in the fish ladder with fresh “gashes” on their sides. The source of these gashes has not been identified, but they may be injured from exposed rebar or other sharp surfaces in the fish ladder. The WWCD will coordinate with ODFW to grind-down or otherwise eliminate sharp surfaces in the fish ladder during the period that it is shut down for dam repairs. If the fish ladder or any component thereof is responsible for injury to fish, these actions would minimize harm to individual adult OC coho salmon that pass through the ladder.

Construction Disturbance and Water quality

Underwater noise. To conduct work on the south spillway gates, the WWCD will install a sheet pile wall to isolate the work area from the river. Pile driving is known to increase underwater sound that can injure or kill fish. Peak sound pressure level (SPL) and sound exposure level (SEL) are used to correlate physical injury to fish from underwater sound pressure. Current NMFS pile driving noise thresholds for physical injury of fish less than 2 grams in size are a peak pressure of 206 dB and an accumulated sound exposure level (SEL), of 183 dB. For all other fish, physical injury thresholds are a peak pressure of 206 dB and an accumulated SEL of 187 dB. In addition, a 150 dB root mean square (rms) threshold for potential behavioral effects is also applied when behavior modification occurs to an individual that results in reduced growth, survival, or fitness. These thresholds only apply to impact hammer pile driving.

The WWCD will use a vibratory hammer to drive the sheet pile to bedrock and then an impact hammer to proof the piles into the bedrock. There are no established injury criteria for vibratory pile driving. Vibratory hammers produce less peak sound pressure than impact hammers and are often employed as an avoidance and minimization measure in the initial placement of the pile by reducing the overall number of strikes necessary to drive the pile to the final elevation. Physical injury to a fish's swim bladder or organs results from quicker, steeper waveforms associated with peak sound pressures created by impact strikes whereas rounded waveforms with slower rise times produced by vibratory hammers do not have the same physical effect to fish during short pile driving periods. Vibratory hammers' sound levels are also generally 10 to 20 dB lower than those from impact pile driving. Resource agencies, in general, agree that vibratory pile driving is an alternative to impact driving that minimizes single-strike peak sound pressure and reduces adverse effects to fish (CalTrans 2020).

The degree to which an individual fish exposed to underwater sound will be affected is dependent on the number of variables such as species of fish, size of the fish, presence of a swim bladder, sound pressure intensity and frequency, shape of the sound wave (rise time), depth of the water around the pile and the bottom substrate composition and texture. High levels of underwater sound have been shown to have negative physiological and neurological effects on a wide variety of vertebrate species (Yelverton et al. 1973; Yelverton and Richmond 1981; Cudahy and Ellison 2002; Hastings and Popper 2005). Risk of injury from underwater noise appears related to the effect of rapid pressure changes, termed barotraumas, especially on gas-filled spaces in the bodies of exposed organisms (Turnpenny et al. 1994). Fish with swim bladders appear to be more susceptible to barotraumas from impulsive sounds (sounds of very short duration with a rapid rise in pressure) because the sounds cause their swim bladders to resonate. When a sound pressure wave strikes a gas-filled space such as the swim bladder, it causes that space to expand and contract. When the amplitude of this vibration is sufficiently high, the pulsing swim bladder can press against, and strain, adjacent organs, such as the liver and kidney. This pneumatic compression causes injury, in the form of ruptured capillaries, internal bleeding, and maceration of highly vascular organs (CalTrans 2002). Sound waves can cause different types of tissue to vibrate at different frequencies, and this differential vibration can tear mesenteries and other sensitive collective tissues (Hastings and Popper 2005). Exposure to high noise levels can also lead to injury through "rectified diffusion," the formation and growth of bubbles in tissues. These bubbles can cause inflammation and cellular damage and block or rupture capillaries, arteries, and veins (Crum and Mao 1996; Vlahakis and Hubmayr 2000; Stroetz et al. 2001). Death from barotrauma and rectified diffusion injuries can be instantaneous or delayed for minutes, hours, or even days after exposure. Broadly, the effects of underwater noise on organisms range from no observable effects to immediate death. Over this range of effect, there is no easily identifiable point at which behavioral responses occur or where the effects transition to physical injury or death. The sounds from impact pile driving can injure and/or kill fishes, as well as temporarily stun them or alter their behavior (Turnpenny et al. 1994; Turnpenny and Newell 1994; Popper 2003; Hastings and Popper 2005).

Sound increases from vibratory and impact pile driving can cause behavior modification in fishes, which may result in injury depending on exposure duration and magnitude. Exposure to noise may affect foraging (Purser and Radford 2011, Slabbekoom et al. 2010) and anti-predator behavior (Voellmy et al. 2014; Simpson et al. 2015) in fishes that may make them more susceptible to predation (Slabbekoom et al. 2010). Purser and Radford (2011) exposed three-spine sticklebacks (*Gasterosteus aculeatus*) to brief and prolonged noise and observed increased food-handling errors and reduced discrimination between food items that, consequently, resulted in decreased foraging efficiency. Voellmy et al. 2014 observed three-spined stickleback respond to a predatory threat quicker under exposure to anthropogenic noise potentially resulting in unnecessary energy expenditure and lost foraging opportunities. Simpson et al. (2015) observed European eels that were 50% less likely and 25% slower to respond to an ambush predator and were caught more than twice as quickly by a pursuit predator under exposure to additional noise. Fish suffering damage to hearing organs may suffer equilibrium problems, and have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings 1996). Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift, or TTS), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings 1996). Feist et al. (1996) noted that juvenile pink and chum salmon exposed to pile driving noise were less likely to startle and flee when approached by an observer. Other types of sub-lethal injuries can place the fish at increased risk of predation and disease. Collectively, behavioral responses can vary broadly, from insignificant to a range of short- and long-term responses limiting to survival, growth, and fitness.

DOWL (2022) obtained the estimated pile driving conditions and duration from Ballard Marine Construction. The assumptions used in assessing the effects of pile driving noise on fish were:

- OC Coho present will be greater than 2 grams in weight;
- Water depth will be zero to 15 feet;
- Sediments are 10 to 20 feet of medium-density sand, silt, and gravel over bedrock;
- Eight 14-inch H-piles will be used as spuds to anchor the sheet pile template;
- Only vibratory hammering will be used to set and remove the spud piles
- AZ sheet piles will be use, and each pair of sheet piles will comprise three feet of the wall;
- 40 pairs of sheet piles will be required (120 feet of sheet pile wall);
- The sheet piles will be vibrated to bedrock and proofed with an impact hammer;
- 20 minutes will be required to vibrate each of the sheet pile pairs to bedrock;
- Pile driving will take three days;
- 40 hammer blows will be required to proof each sheet pile pair;
- Ten minutes will be required to proof each sheet pile pair (for a total duration of 20 minutes for each pile pair of combined vibratory and impact driving);
- Twelve pairs will be installed per day on the longest pile driving day; and
- Sound pressure for the sheet piles will be from two different monitoring events to illustrate the differences in site specific differences:
    - Based on Caltrans (2020): 205 dB peak, 180 dB SEL, and 190 dB RMS, measured 10 meters from the pile
    - Based on GRI (2021) without attenuation: 185 dB peak, 159 dB SEL, and 173 dB RMS, measured 24.4 meters from the pile (these are the peak measured values, the mean measured values are lower). The sheet pile tested by GRI is larger than the sheet pile proposed for the proposed action and larger piles typically produce greater sound pressure levels.

NMFS provides a calculator to estimate the distance to the physical injury and behavioral modification thresholds from pile driving noise. Inputs required for the calculator include the single-strike sound pressure levels for a given distance from the pile, and the estimated number of pile strikes. This calculator only works for impact hammer driving and is not applicable to vibratory pile driving. Results are presented in Table 4.

Table 4. NMFS calculation results for impact hammer pile driving and distances (feet) to physical injury and behavioral modification thresholds.

NMFS Regulatory Thresholds	Onset of Physical Injury			Behavioral (dB RMS)
	Peak SPL (dB)	Cumulative SEL (dB)		
		Fish > 2 grams	Fish < 2 grams	
	206	187	183	150
NMFS Calculator Results - Distance to Sound Threshold (feet)				
CalTrans (2020)	28	687	1,269	15,228
GRI (2021)	3	67	123	2,733

Note that the sheet pile used in GRI (2021) is larger than the sheet pile that the WWCD will use for the proposed action (smaller piles produce lower sound levels) and water depth in the action area is 0 to 15 feet and less than water depths in GRI (2021) (20 feet) and CalTrans (2020) (33 feet). Therefore, there will be much less pile length in contact with the water column. With less pile length exposed to the water, noise propagation will likely be decreased. It is also important to note that predicting sound detectability with any certainty is not possible at distances beyond 3,280 feet from the sound source (CalTrans 2015, NMFS 2022). Sound travel through water is line of sight and constrained by river bends and other channel features. In the reservoir in the action area the distance sound will travel is constrained by a bend in the river channel upstream. Thus, underwater sound generated from pile driving is expected to travel through the wetted area of the reservoir for approximately 2,200 feet. We do not expect sound to travel much, if at all, downstream past the dam since the dam likely acts as a block to sound downstream.

Quantifying the number of individual juvenile OC coho salmon in the action area affected by underwater sound is difficult because there is no data estimating the density of coho salmon in the reservoir. However, it is very likely that the number of individuals will be low because water temperatures during the last two weeks of August (when pile driving is most likely to occur) will be above those preferred by rearing and migrating OC coho salmon. During this time, 7-day average maximum water temperature at Winchester Dam ranged from 67 °F to 72.9 °F in 2017 (the coolest year since 2016); and from 70°F to 75.7 °F in 2021 (the hottest year during that period). Those individuals exposed to underwater sound at or above the thresholds within the distances shown in Table 4 will experience behavior modification and injury resulting in reduced growth, survival, and fitness.

Decreased Forage. When the reservoir is dewatered and the work areas are isolated, abundance and productivity of aquatic insects and juvenile OC coho salmon prey organisms will be reduced. The effects of the reservoir dewatering will extend approximately 1.45 miles upstream and cover approximately 44 acres of the reservoir area. When the lake is drained, juvenile OC coho salmon will be restricted to the historic river channel and will not have access to previously inundated areas which may be productive locations for aquatic invertebrates. The reduction in juvenile OC coho salmon prey organism abundance and productivity would last for weeks to months as aquatic invertebrates recolonize the affected dewatered areas.

Growth in salmon and temperature are related. Temperature growth limits for salmon are those lower and upper temperatures that result in zero growth in an individual. If food becomes limited, the positive growth zone (zone between the upper and lower temperatures) can be reduced dramatically. With food limitation, the upper temperature that produces zero growth would decline to a lower temperature (EPA 2001). Cessation of growth has been reported above 68.54 °F (20.3 °C) (Brett 1952, Reiser and Bjornn 1979), which will likely be exceeded during dewatering and work area isolation. Food limitation combined with temperatures higher than the upper zero growth temperature would result in an individual not getting enough food to satisfy its energy requirements, causing a reduction in growth (EPA 2001). The small number of juvenile OC coho salmon that are present in the action area under these conditions (high temperature and reduced forage abundance) will experience a reduction in growth due to the lack of forage and water quality conditions in the action area during construction.

Increased suspended sediment. Construction activities including operation of the gates to achieve drawdown elevation, cutoff wall/cofferdam installation, removal of aggregate from temporary road and staging areas, heavy equipment usage on the bank, and annual operation of the south spillway gates are likely to temporarily increase concentrations of suspended sediments in the action area. Short-term pulses of sediment are likely to occur during installation of the sheet pile wall, installation and removal of cofferdams, and when in-water work areas are re-inundated. Suspended sediments in the water are measured as milligrams per liter (mg/L). Turbidity is a measure of the amount of suspended solids in water and is measured in nephlometric turbidity units (NTUs). Turbidity can increase because of an increase in suspended sediments.

Suspended sediment is associated with negative effects on the spawning, growth, and reproduction of salmonids (Noggle 1978, Berg 1982, Lloyd et al. 1987, Reid 1998). Suspended sediments may affect salmonids by altering their physiology, behavior, and habitat, all of which may lead to physiological stress and reduced survival rates (Bash et al. 2001) (Table 5) or even death. Death of coho salmon caused by exposure to suspended sediment has been observed at suspended sediment concentrations of 1,217 mg/l for presmolt coho and 509 mg/L for coho salmon smolts (Stober et al. 1981) and 1,200 mg/L for juvenile coho salmon (Noggle 1978).

Table 5. Effects of turbidity on salmonids (from Bash et al. 2001) that result in individual injury or death.

Physiological	Behavioral
Gill trauma	Avoidance
Osmoregulation	Territoriality
Blood chemistry	Foraging and predation
Reproduction and growth	Homing and migration

Physiological effects of suspended sediments on coho salmon include gill trauma (increased cough frequency, gill flaring, gill abrasion); increased levels of blood glucose, plasma glucose, and plasma cortisol (all indicators of physiological stress), osmoregulatory ability (Redding et al. 1987, Servizi and Martens 1987), and reduction in growth. Servizi and Martens (1992) and Berg (1982) found that cough frequency was increased in coho salmon at suspended sediment concentrations resulting in turbidity of 30 and 60 NTUs. Berg and Northcote (1985) reported increased gill flaring in coho salmon after a short-term sediment pulse of 60 NTUs and that gill flaring continued after turbidity was reduced to 30 and 20 NTUs. After exposure to suspended sediments, Noggle (1978) conducted histological examinations that found damage to gill structures. Gill trauma, if continued, results in mucus production to protect the fill surface, which may interfere with fish respiration (Berg 1982). Servizi and Martens (1992) reported elevated blood sugar levels in age-0 coho salmon exposed to sublethal concentrations of suspended sediments that resulted in turbidity levels of 0, 3, 30, 260, and 666 NTUs. Stress to salmonids can affect the parr-smolt transformation, resulting in impaired migratory behavior, decreased osmoregulatory competence, and reduced early marine survival (Wedemeyer and McLeay 1981). Sigler et al. (1984) reported a reduction in growth for coho salmon exposed to suspended sediments resulting in turbidity of as little as 25 NTUs.

Behavioral effects of suspended sediments or turbidity on coho salmon include avoidance, territoriality, and foraging. Juvenile coho salmon exhibited avoidance behavior when exposed to 22 to 265 NTUs of turbidity (Sigler 1980, Sigler et al. 1984). Increased suspense sediments resulting in turbidity ranging from 25 to 50 NTUs caused more juvenile coho salmon to leave laboratory streams than did clear water (Sigler et al. 1984). Servizi and Martens (1987) estimated that the threshold for avoidance resulting from increased suspended sediments by juvenile coho was a turbidity of 37 NTUs. Berg (1982) and Bisson and Bilby (1982) significant avoidance responses to suspended sediments by juvenile coho salmon when turbidity was 60 and 70 NTUs, respectively. Reductions in territoriality behavior have been observed in juvenile coho salmon when exposed to turbidity concentrations resulting from suspended sediments as low as 20 NTUs (Berg 1982) with reduced territoriality more evident at 30 and 60 NTUs (Berg and Northcote (1985). Studies have indicated that the effectiveness of coho salmon in obtaining food is reduced by turbidity levels as low as 20 NTUs (Berg 1982, Berg and Northcote 1985).

As described above, the proposed action will increase suspended sediments and turbidity in the action area. The turbidity plume will likely extend up to approximately 1,000 feet downstream of the dam and disperse across the channel as it flows downstream. However, the part of the plume that exceeds 30 NTUs for 4 hours or more would likely be visible downstream for a lesser distance of approximately 600 feet and extend approximately 80 feet into the channel from the south river bank. Quantifying the number of individuals adversely affected by increased suspended sediments is difficult. However, it is likely the number will be small because juvenile coho salmon typically prefer to rear in cooler tributary streams that have more complex habitat than is present in the action area and water temperatures in the action area are likely to be higher than those preferred by juvenile OC coho salmon for rearing. Therefore, a small number of juvenile OC coho salmon will be injured by suspended sediments during construction.

As previously discussed, the annual operation of the gates, as required by OAR 690-020-0250 (2)(f), is planned to coincide with periods of higher flow in the system while background turbidity is naturally elevated, which is between January and March each year. The gates will be opened long enough to ensure a full opening/closing cycle and to complete necessary maintenance and lubrication. The District anticipates this cycling will take three to four hours for both gates. During the gate openings there is a potential for sediment to become suspended and to be flushed through the gates downstream. Turbidity that results from the gate openings will need to be monitored and controlled according to DEQ turbidity monitoring criteria, see Terms and Conditions of this Opinion. With these controls implemented, harm to fish should be minimized; however, any fish that may be directly exposed to increased turbidity during the gate openings may be displaced, or experience other disruptive effects of turbidity that may alter normal rearing behavior. These effects will likely extend up to approximately 1,000 feet downstream of the dam and disperse across the channel as it flows downstream. However, the part of the plume that exceeds 30 NTUs for 4 hours or more would likely be visible downstream for a lesser distance of approximately 600 feet and extend approximately 80 feet into the channel from the south river bank. However, individual OC coho salmon exposed to the increase in suspended sediments and turbidity will only experience injury, behavior modification, or death for no more than a day. Therefore, the number of OC coho salmon adversely affected by increased turbidity from suspended sediment is likely small.

Chemical contaminants. Chemical contaminants include those associated with construction equipment and materials used for repair of the dam (concrete, polyurethane foam, and poly resin). During equipment operation for construction, small operational leaks or spills (a few ounces) of fuel, oil, or hydraulic fluids from equipment operation on barges, overwater structures, or on-shore facilities are likely to occur. The most likely scenario for fuel or oil contact with water in the action area is smaller leaks composed of diesel fuel or lubricating oils. All construction activities will comply with a spill prevention plan and a stormwater discharge plan to be completed by the contractor and the following conservation measures will be implemented:

- All personnel will be made aware of spill prevention and response procedures.
- All equipment used will be clean and inspected daily prior to use to verify that the equipment has no fluid leaks. Should a leak develop during use, the leaking equipment

will be removed from the project site immediately and not used again until it has been adequately repaired. At no time will fuels or oils be allowed to enter any waterbody.

- Stationary equipment, such as generators, with fuel tanks larger than five gallons will be placed in containment while in use. The containment vessel will have a receiving volume at least as large as the volume of all fluids in the equipment being contained.
- Non- stationary construction equipment will be serviced, stored, and fueled at least 100 feet away from the shoreline. Location of vehicles, equipment and fuel storage areas, and fuel containment measures, will be approved and monitored by the Project Engineer.
- Floating hazardous material containment booms and spill containment booms will be maintained on site during all phases of construction to facilitate the cleanup of hazardous material and equipment liquid spills.

Based on these, the effects on individual OC coho salmon from contaminant release associated with construction equipment will not be meaningful and will not elicit an adverse response from any exposed individual OC coho salmon.

As described in Section 2.5.1, *Effects on Critical Habitat*, uncured or partially-cured concrete can leach hydroxyl ions into surrounding waters raising the pH, which can be toxic to salmonids. In October 2018, dam repair activities in the action area resulted in the discharge of wet (green or uncured) concrete that caused the death of juvenile Chinook salmon, juvenile steelhead, lamprey larvae, and mussels.[8] The WWCD will conduct concrete work in the work isolation areas and implement conservation measures in Section 2.5.1 of this opinion. The likelihood of any OC coho salmon juveniles being exposed to the effects of concrete is low and unlikely to adversely affect any individual OC coho salmon in the action area.

As described in Section 2.5.1 of this opinion, the reservoir formed behind Winchester dam is surrounded by residential space and is used for recreational purposes. It is possible that chemical inputs from lawn fertilizer, herbicides, pesticides, and watercraft related chemicals are present within the reservoir sediments. However, the sediment has not been subject to testing since the dam's construction, making it difficult to determine whether these chemicals could be present in detectable or harmful levels. Given the age of the dam, and reservoir uses it is reasonable to assume some level of chemical constituents are likely present in the reservoir sediment. No assumption about what the level of contaminants in the sediment or the effects on OC coho salmon individuals can be made at this time due to the lack of data.

Long-term Effects

Long-term effects are those effects that will be perpetuated well into the future (decades), including those effects on ESA-listed species that will persist due to the continued presence of the dam, which this proposed action ultimately facilitates. Long term effects of the continued existence of Winchester Dam include fish passage, water quality, and habitat modification including continued reduced stream complexity.

Fish Passage

The status of fish passage at Winchester Dam is described in Section 2.4, *Environmental Baseline*. Leaks in the dam have created false attraction flow which may interfere with fish using the current side ladder entrance, likely delaying passage of some adult salmonids for some period of time (DOWL 2022). Although, there are no studies or data that would quantify the current delay in fish accessing and passing through the ladder. The intent of the proposed action is to repair leaks in the dam that are likely causing false attraction flow that causes a delay in adult OC coho salmon finding the entrance to the fish ladder, potential injury to adult OC coho salmon from failed attempts in jumping at the dam, and extending the useful service life of the dam by decades to preserve the reservoir for users that live along the reservoir. Eliminating false attraction flows will reduce the number of adult OC coho salmon that experience delay in fish passage or are injured from jumping at the dam to the point where we do not expect continued impacts of this nature or measurable take of individuals. Downstream passage occurs through the fish ladder or over the crest of the dam, which includes a freefall of approximately 15 feet to the river below. The proposed action will facilitate the continued existence of the dam; therefore, coho salmon that go over the edge of the dam face would likely continue to be unable to migrate upstream through the fish ladder because of its design and flow conditions in the ladder, in an atypical case where a juvenile may temporarily resist migrating downstream. NMFS is not aware of this occurring at measurable levels. Assuming the District refills the reservoir to the level necessary to operate the fish ladder year-round, the ongoing effects of the dam discussed previously, and relative to fish passage, will continue to persist, but may be somewhat improved by fish ladder improvements and fixing leaks in the dam that could result in delayed passage and fish injury.

Water Quality

Suspended sediments and turbidity. Section 2.4, *Environmental Baseline*, describes suspended sediment and turbidity in the action area. The action area is 303(d) listed by the ODEQ for turbidity in the action area, which means turbidity exceeded 5 NTUs for greater than 45 days for 10 years. The proposed action will facilitate the continued existence of the dam necessitating annual operation of the south spillway gates on the south side of the dam. Per Oregon Administrate Rule 690-020-0250 (2)(f), "Proper cycling and lubrication of Valves and Gates at least once a year, unless otherwise specified in a maintenance and operations plan approved by the Department" is required for dam safety. With each instance of south spillway gate maintenance operation sediments stored in the reservoir upstream of the south spillway gates will be released downstream on an annual basis. These will be timed with consideration of river discharge to minimize the effects of increased suspended sediments and turbidity in the action area. In February 2023, the WWCD conducted this maintenance on the south spillway gates and released sediment that resulted in a turbidity plume on the south side of the river downstream for approximately 600 feet. Concentrations of suspended sediments in the plume are unknown, but the sediment release likely exceeded ODEQ water quality standards for sediment.

Because the concentration of the released sediment is unknown, it is difficult to determine the magnitude of effect on individual OC coho salmon exposed to the turbidity plume. Based on the short duration of the previous plume (less than 4 hours), NMFS assumes that during future similar gate operations, OC coho salmon would be unlikely to experience any measurable harm, injury or death.

Water temperature. Section 2.4, *Environmental Baseline*, discusses the effects of the dam and reservoir on water temperature in the action area. During August, 7-day average maximum water temperature at Winchester Dam ranged from 67 °F to 72.9 °F in 2017 (the coolest year since 2016); and from 70°F to 75.7 °F in 2021 (the hottest year during that period). It is difficult to determine how the dam and reservoir affect water temperature in the North Umpqua River, but the best available data indicates that any effect is likely minor and not meaningful since the increase in the reach of the river containing the reservoir is within the upper and minimum bounds of the upstream and downstream free-flowing reaches. The proposed action will continue the ongoing effects of the presence of the dam on water temperature. Based on existing information, effects on OC Coho as a result of water temperature modifications from the dam, are likely minor.

Habitat Modification

The reservoir is currently dominated by the persistent presence of Eurasian Water Milfoil (Personal communication, Ryan Beckley, June 9, 2023), the invasive species is not considered a favorable attribute or significant source of natural cover for rearing juvenile OC coho salmon, and may crowd out beneficial vegetation needed by rearing juveniles. The proposed action is not likely to exacerbate the Water Milfoil issue present within the reservoir, but it is unlikely to reduce its overall impact either. The proposed action will repair the dam, thus extending the useful service life of the dam and reservoir for decades beyond its existing service life and the favorable habitat conditions for growth and existence of Eurasian Water Milfoil in the reservoir. However, we do not expect measurable harm to OC Coho as a result of these effects.

The proposed action will ensure the continued existence of the dam beyond the life of the current structure; therefore, the current lack of floodplain connectivity and reduced stream complexity associated with the structure will persist. Stream complexity generally includes natural elements that provide areas of rest and refuge, forage, and shelter to rearing juveniles. Lack of large wood limits areas of shelter and forage needed by rearing juveniles. Additionally, gravel recruitment might be limited by the dam, which contributes to critical habitat-forming processes downstream. Both of these elements would typically contribute to stream complexity and will remain suppressed with the continued presence of the dam. Additionally, the dam, and surrounding urbanization of the action area, prevent natural channel migration processes and floodplain connection that would otherwise occur. This situation would persist under the proposed action.

2.6. Cumulative Effects

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

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

Non-project related land and waterway management activities including agriculture, forestry, grazing, road building and maintenance, urbanization, population growth, expanded development and reservoir recreation will continue to degrade aquatic habitat for OC coho salmon in the action area. These activities will continue to impact water quality by increasing water temperatures, adding chemicals to the water (stormwater contaminants associated with urbanization and recreational boating), increasing sedimentation, increasing predation on OC coho salmon; and reducing large wood for creation of complex habitats. Impacts associated with these activities are ongoing and likely to continue to have a depressive effect on critical habitat quality and function resulting in additional stress on OC coho salmon in the action area. Therefore, we expect cumulative effects to cause a slight to moderate negative effect on population abundance and productivity. Likewise, we expect the quality and function of OC coho salmon critical habitat PBFs in the action area will continue to be negatively impacted as a result of cumulative effects.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species and critical habitat. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

2.7.1 Critical Habitat

The critical habitat unit that supports OC coho salmon is the Lower North Umpqua fifth-field watershed (HUC5 1710030111). The CHART described the conservation value of a critical habitat unit as depending on the importance of the populations associated with a critical habitat unit to the ESU conservation and the contribution of that critical habitat unit to the conservation of the population either through demonstrated or potential productivity of the area. The CHART rated this watershed as having a high conservation value. A high conservation value means that the critical habitat unit is essential for the conservation of the population of OC coho salmon that it supports.

Climate change is likely to adversely affect the overall conservation value of OC coho salmon designated critical habitats. The adverse effects are likely to include, but are not limited to, depletion of cold-water habitat and other variations in quality and quantity of spawning, rearing, and migration habitats. The magnitude and severity of these effects will vary from year to year.

The long-term effects of the proposed action will last for decades beyond the existing useful service life of the dam and will overlap with the effects of climate change listed above. However, the proposed action's effects would unlikely exacerbate the effects of climate change in the action area or the critical habitat unit because the dam's effects on the environmental stressors (water temperature, water quantity) most likely to be affected by climate change will be minor and not meaningful.

The environmental baseline is degraded by past land and waterway management activities including agriculture, forestry, grazing, road building and maintenance, urbanization, dam construction and operation and maintenance, and reservoir recreation will continue to degrade aquatic habitat for OC coho salmon in the action area. These activities will continue to impact water quality by increasing water temperatures, adding chemicals to the water (stormwater contaminants associated with urbanization and recreational boating), increasing sedimentation, increasing predation on OC coho salmon, reducing sediment transport processes, and reducing large wood for creation of complex habitats. Each of these activities has contributed to a myriad of interrelated factors for the decline in quality and function of critical habitat PBFs essential for the conservation of OC coho salmon in the action area and watershed.

The primary and secondary limiting factors to the North Umpqua population are stream habitat complexity and water quality and quantity (NMFS 2016). The proposed action will perpetuate the current lack of stream complexity. Stream complexity generally includes natural elements that provide areas of rest and refuge, forage, and shelter to rearing juveniles. Additionally, the dam, and surrounding urbanization of the action area, prevent natural channel migration processes and floodplain connection that would otherwise occur. This situation would persist under the proposed action. Additionally, the North Umpqua River is designated critical habitat for migration and rearing, therefore, the PBFs limiting quality and function of critical habitat in the action area and critical habitat unit are natural cover, water quality, and water quantity. Relative to the baseline condition, the adverse effects of dam repair on natural cover will result in the continued reduced and simplified condition of natural cover for decades beyond the current useful service life of the dam, but these effects will not extend beyond the action area. The water temperature related effects of the dam on water quality, although long-term, are minor and will not result in a meaningful change to water quality in the action area. The adverse effects of construction activities on water quantity are short-term lasting for weeks and will be localized to the action area, and represent only a minor deviation from the baseline condition. Because the effects of the proposed action on the natural cover, water quality, and water quantity PBFs are short-term, minor, and localized to the action area, the proposed action is not likely to reduce the quality and function of these PBFs or meaningfully affect their limiting factors in the action area or at the critical habitat unit scale.

Non-project related land and waterway management activities including agriculture, forestry, grazing, road building and maintenance, urbanization, and reservoir recreation will continue to degrade aquatic habitat for OC coho salmon in the action area. Impacts associated with these activities are ongoing and likely to continue to have a depressive effect on critical habitat features essential to support the North Umpqua population of OC coho salmon. Therefore, we expect the quality and function of OC coho salmon critical habitat PBFs in the action area will continue to be negatively impacted because of cumulative effects.

The effects of the proposed action, when added to the status of OC coho salmon critical habitat, environmental baseline, and cumulative effects, will not appreciably reduce the quality and function of critical habitat in the action area or critical habitat features of the critical habitat unit. Therefore, the action will not impair the ability of this critical habitat in the Lower North Umpqua fifth-field watershed to play its intended conservation role of supporting the North Umpqua population of OC coho salmon.

2.7.2 Listed Species: OC Coho Salmon ESU

Section 2.2.2, *Status of Species*, describes the status of the North Umpqua population of OC coho salmon. Since 1990, the North Umpqua River population has shown an increasing trend in spawner abundance (Figure 1). The most recent DSS persistence score for the North Umpqua population was 0.52. This indicates moderate certainty that the North Umpqua population will persist, or not go extinct over a 100-year period, including the ability to survive prolonged periods of adverse environmental conditions. The most recent sustainability score, -0.41, indicates that moderate certainty that the population will not be able to maintain its genetic legacy and long-term adaptive potential for the foreseeable future, although population persistence and sustainability DSS scores have shown an increasing trend over the last three status reviews (Stout et al. 2012, NWFSC 2015, Ford 2022) (Table 3). The effects on this population would be the integrated response of individuals to the environmental changes resulting from the environmental baseline, effects of the proposed action, and cumulative effects relative to the status of the population and its limiting factors. Limiting factors for the North Umpqua population of OC coho salmon include stream complexity and water quality and quantity (NMFS 2016).

Climate change is likely to adversely affect OC coho salmon. The adverse effects are likely to include, but are not limited to, individual reduced growth, survival, and fitness due to depletion of cold-water habitat and other variations in quality and quantity of spawning, rearing, and migration habitats. The magnitude and severity of these effects on individuals and populations of the OC coho salmon ESU will vary from year to year. The long-term effects of the proposed action will last for decades beyond the existing useful service life of the dam and will overlap with the effects of climate change listed above. However, the proposed action's effects would be unlikely to exacerbate the effects of climate change in the action area on OC coho salmon because the dam's effects on the environmental stressors (water temperature, water quantity) most likely to be affected by climate change will be minor and not meaningful in the action area. Therefore, effects of the proposed action combined with the effects of climate change are not likely to appreciably decrease abundance of OC coho salmon at the population level, or adversely influence the overall contribution of the Umpqua strata to the ESU.

Project-related activities and non-project related land and waterway management activities including agriculture, forestry, grazing, road building and maintenance, urbanization, and reservoir recreation will continue to have a depressive effect on individuals in the North Umpqua population of OC coho salmon. These effects include, but are not limited to, those stemming from continued reductions in stream complexity, which is a limiting factor for recovery as discussed previously (NMFS 2016). We expect OC coho salmon of this population in the action area will continue to be negatively impacted because of cumulative effects. The North Umpqua population plays an important role to the persistence and sustainability of the Umpqua strata and the ESU as a whole. Depressive effects of cumulative ongoing activities combined with project-related impacts on the North Umpqua population may carry through to the larger ESU to a small degree.

The effects of the proposed action, when added to the status of OC coho salmon, environmental baseline, and cumulative effects will not appreciably reduce the likelihood of the survival or recovery of the North Umpqua population of OC coho salmon, or substantially adversely impact the ESU. Based on our conclusion that the populations' survival and recovery will not be appreciably reduced because of the proposed action, the proposed action will not appreciably reduce the likelihood of the survival or recovery of the OC coho salmon ESU.

2.8. Conclusion

After reviewing and analyzing the current status of the OC coho salmon ESU and their 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 the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of OC coho salmon or destroy or adversely modify its designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim 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.

2.9.1 Amount or Extent of Take

Fish may be taken by harm, harassment, injury or death as a result of the general construction disturbance, noise generated by pile driving, lack of fish passage, increased turbidity, fish salvage actions, and lack of access to habitat, all of which forms of take NMFS expects to be limited to the three-week drawdown. The OC Coho Recovery Plan (NMFS 2016), identifies stream complexity and water quality and water quantity as primary and secondary limiting factors for recovery for the North Umpqua population. The proposed action is not likely to substantially reduce or improve these limiting factors; however, NMFS remains committed to improving stream complexity for this population and the Umpqua stratum of OC coho to support recovery of the ESU. The effects of the proposed action are limited to short-term impacts to fish passing the action area during the three-week work period, and some potential impacts to habitat access resulting from the presence of the dam, neither of which will interact with any of the notable limiting factors to the recovery of OC coho.

As described below, accurately quantifying the number of fish harmed by several of these pathways is not possible because injury and death of individuals in the action area is a function of habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes are highly variable and interact in ways that may be random or directional, and may operate across broad temporal and spatial scales. The precise distribution and abundance of fish within the action area, at the time of the action are not a simple function of the quantity, quality, or availability of predictable habitat resources within that area. Rather, the distribution and abundance of fish also show wide, random variations due to biological and environmental processes operating at much larger demographic and regional scales. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can we precisely predict the number of fish that are reasonably certain to be injured or killed either directly or if their habitat is modified or degraded by actions that will be completed under the proposed action. It may be possible to observe and document injured or killed individual fish, but not all instances of death or injury are likely to be observed during construction. Except where fish salvage efforts are employed where the number of fish handled, injured, or killed will be recorded, it is not practical or realistic to attempt to identify and monitor the number of fish taken by the other pathways described.

In cases such as this, where observing and quantifying a number of fish taken as a result of the proposed action is not possible, we use take surrogates indicators that rationally reflect the incidental take caused by the proposed action. We identified three separate surrogates to serve as indicators for the extent of take caused by the proposed action: (1) the footprint of the isolated/dewatered work area, and length of time the reservoir is drawn down to dewater the fish ladder and unable to pass fish; (2) the extent of visible suspended sediment plumes; and (3) length and frequency of disturbance from pile driving noise. Take associated with fish salvage does not require a take surrogate as mortality will be measured and reported during fish salvage efforts.

1. The footprint of the dewatered work areas is associated with take due to injury, death, or harm from work area isolation, passage delay, and fish capture. That harm cannot reliably be monitored and quantified, as only some incidences of capture and mortality can be observed while other harm cannot be reliably observed. Therefore, NMFS will rely on a two-factor surrogate consisting of the geographic extent of the dewatered work area footprint, as well as the extent of time during which the fish ladder will be dewatered. The footprint of isolated and salvaged areas and the time required for the work are directly related to the extent of take because the extent of fish exposed and harmed by the action increases with the size of the area and the duration of the action. Based on information provided in the biological assessment, there are likely to be approximately 45 acres of dewatered area to facilitate access to the dam to complete the repairs, which should be concluded in no more than three weeks.

Separate from this surrogate measure of take, NMFS expects no more than 2% of the individual OC coho collected as part of the fish salvage operations to experience mortality (lethal take) during construction.

The extent of take expected is that associated with dewatering approximately 45 acres in direct proximity to the dam, dewatering the fish ladder for three weeks, refilling the reservoir to the level necessary to operate the fish ladder year-round; and fish salvage. This take can be reliably measured and monitored because (1) three weeks is the ODFW-approved drawdown work window during which the fish ladder will be dewatered and not functional; (2) approximately 45 acres is the measurable estimated footprint of dewatered reservoir area during the drawdown; (3) the reservoir elevation necessary to operate the fish ladder year round is determined by fish ladder functionality which is easily observable; and (4) take associated with fish salvage will be monitored according to the terms and conditions of this Opinion, to determine when or if, more than 2% of salvaged and relocated fish are killed, which is a standard take threshold for assessing mortality associated with fish salvage.

2. Take occurring as a result of sediment released as part of the proposed action, including gate opening to dewater the area behind the dam for construction, and annual gate operations, cannot be observed or measured and also requires a surrogate. The extent of take associated with the release of sediment correlates directly to the extent of suspended sediment plumes caused by the construction activities, which in turn correlates to the distance of any visible sediment plume, because the extent of the plume (and its visible portion) is directly related to the number of fish exposed to the harm associated with the take pathway. Based on the location of anticipated construction events, the surrogate measure of take is any turbidity event which exceeds 10% above natural stream turbidities, and which creates a visible plume of this excess turbidity extending not more than 600 feet and lasting no longer than 4 hours. This extent of turbidity can be reliably measured and monitored by visual monitoring or using a turbidimeter, and this monitoring is expected to occur as part of the reporting requirements in the terms and conditions below.

3. Twelve pairs of sheet piles will be installed per day over three days including proofing each sheet pile pair with an impact hammer. This activity causes take via harassment associated with the resulting noise and vibrations. Because these forms of harassment cannot be observed or quantified, we will rely on a surrogate measure of take in the form of the time needed to complete the installation, which is no more than three days. This extent of time can be reliably monitored as part of the reporting requirements, which will document all construction activities, including the dates on which they occurred.

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are 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 associated with project construction by ensuring that all conservation measures described in the proposed action and this Opinion are implemented and reported, as appropriate.

2. Minimize incidental take associated with post-construction operations by ensuring development and implementation of a comprehensive monitoring and reporting program conducted by the Corps or its applicants.

2.9.4 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 Corps or 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:

   In-water work window and fish ladder downtime: Work must be completed within the July 7, 2023 - August 28, 2023 ODFW-approved work window. If work cannot be completed within the work window or fish ladder dewatering exceeds the three-week time period approved by ODFW (August 7, 2023- August 28, 2023), the Corps shall coordinate as soon as practicable, with NMFS and ODFW to determine next steps without guarantee of extension of ESA coverage.

   Conservation measure implementation: If conservation measures included in the proposed action are not implemented or unable to be implemented during the course of construction, the Corps shall coordinate with NMFS as soon as this information is known to determine the appropriate path forward that minimizes adverse effects on OC coho and critical habitat.

   Deviations from proposed action: If any part of the proposed action, as described in this Opinion, is modified or requires some deviation from what is analyzed in this document, the Corps shall coordinate with NMFS as soon as this information is known, and work shall not proceed on the modified element of the project until NMFS reviews the project modification(s).

   Soft start procedures for impact pile driving: NMFS understands the majority of pile driving will use a vibratory hammer; however, impact hammer will be used to proof pilings and sheet piles into the bedrock. When initiating impact pile driving activity, begin with several light taps followed by actual pile driving force needed to set the piles. This can help increase distance between fish that may be affected by noise created by impact pile driving and the source of the sound.

Fish salvage: Fish Capture and Release:

a. Fish salvage is expected to occur throughout the duration of the project. If practicable, allow listed fish species to migrate out of the work area or remove fish before dewatering; otherwise remove fish from the exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, or trapping with minnow traps (or gee-minnow traps).

b. Fish capture will be coordinated with ODFW and supervised by a qualified fisheries biologist with experience in work area isolation and competent to ensure the safe handling of all fish.

c. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.

d. Monitor the nets frequently enough to ensure they stay secured to the banks and free of organic accumulation.

e. Electrofishing should be used during the coolest time of day, only after other means of fish capture are determined to be not feasible or ineffective.

- **i.** Do not electrofish when the water appears turbid, e.g., when objects are not visible at a depth of 12 inches.
- **ii.** Do not intentionally contact fish with the anode.
- **iii.** Follow NMFS (2000) electrofishing guidelines, including use of only direct current (DC) or pulsed direct current within the following ranges:11
    1. If conductivity is less than 100 µs, use 900 to 1100 volts.
    2. If conductivity is between 100 and 300 µs, use 500 to 800 volts.
    3. If conductivity is greater than 300 µs, use less than 400 volts.
- **iv.** Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.
- **v.** Immediately discontinue electrofishing if fish are killed or injured, i.e., dark bands visible on the body, spinal deformations, significant descaling, torpid or inability to maintain an upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.

f. If buckets are used to transport fish:

- **i.** Minimize the time fish are in a transport bucket.
- **ii.** Keep buckets in shaded areas or, if no shade is available, covered by a canopy.
- **iii**. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.
- **iv.** Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.
- **v**. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.

vi. Be careful to avoid mortality counting errors.

Turbidity Control and Monitoring:
The Corps must ensure the applicant implement BMPs to minimize turbidity during in-water work. Any activity that causes turbidity to exceed 10% above natural stream turbidities is prohibited except as specifically provided below:

a. Turbidity monitoring must be conducted and recorded as described below. Monitoring must occur at two-hour intervals each day when in-water work is being conducted. A properly calibrated turbidimeter is required unless another monitoring method is proposed and authorized by DEQ.

i. Representative Background Point: The Applicant must take and record a turbidity measurement every two hours during in-water work at an undisturbed area. A background location shall be established at a representative location approximately 100 feet up-current of the in water activity unless otherwise authorized by DEQ. The background turbidity, location, date, tidal stage (if applicable) and time must be recorded immediately prior to monitoring downcurrent at the compliance point described below.

ii. Compliance Point: The Applicant must monitor every two hours. A compliance location shall be established at a representative location approximately 100 feet down-current from the disturbance at approximately mid-depth of the waterbody and within any visible plume. The turbidity, location, date, tidal stage (if applicable) and time must be recorded for each measurement.

b. Compliance: The Applicant must compare turbidity monitoring results from the compliance points to the representative background levels taken during each two – hour monitoring interval. Consistent with DEQ Nationwide Permit #3, short term exceedances are allowed as follows:

MONITORING WITH A TURBIDIMETER EVERY 2 HOURS	
Turbidity Level	**Restrictions to Duration of Activity**
0 to 4 NTU above background	No Restrictions
5 to 29 NTU above background	Work may continue maximum of 4 hours. If turbidity remains 5-29 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-4 above background.
30 to 49 NTU above background	Work may continue maximum of 2 hours. If turbidity remains 30-49 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-4 above background.
50 NTU or more above background	Stop work immediately and inform DEQ

c. Reporting:

i. Record all turbidity monitoring required by subsections (a) and (b) above in daily logs which must include: calibration documentation; background NTUs;

compliance point NTUs; comparison of the points in NTUs; and location; date; and time for each reading.

ii. A narrative must be prepared discussing all exceedances with subsequent monitoring, actions taken, and the effectiveness of the actions. The Corps must ensure the applicant make available copies of daily logs for turbidity monitoring to regulatory agencies including DEQ, USACE, NMFS, USFWS, and ODFW upon request.

iii. Keep records on file for the duration of the permit cycle.

d. BMPs to Minimize In-stream Turbidity: The Corps must ensure the applicant implement the following BMPs, unless accepted in writing by NMFS:

i. Sequence/Phasing of work – The Corps must ensure the applicant schedules work activities so as to minimize in-water disturbance and duration of in-water disturbances.

ii. Bucket control - All in-stream digging passes by excavation machinery and placement of fill in-stream using a bucket must be completed so as to minimize turbidity. All practicable techniques such as employing an experienced equipment operator, not dumping partial or full buckets of material back into the wetted stream, adjusting the volume, speed, or both of the load, or using a closed-lipped environmental bucket must be implemented;

iii. The Corps must ensure the applicant limits the number and location of stream-crossing events. Establish temporary crossing sites as necessary at the least sensitive areas and amend these crossing sites with clean gravel or other temporary methods as appropriate;

iv. Machinery may not be driven into the flowing channel, unless authorized in writing by NMFS; and

v. Excavated material must be placed so that it is isolated from the water edge or wetlands, and not placed where it could re-enter waters of the state uncontrolled.

vi. Containment measures such as silt curtains, geotextile fabric, and silt fences must be in place and properly maintained in order to minimize in-stream sediment suspension and resulting turbidity.

2. The following terms and conditions implement reasonable and prudent measure 2:

Additional Monitoring and Reporting:

a. **Fish Passage.** Visual observation of fish passage through the fish ladder shall continue post construction to assess ladder improvement success, and whether the false attraction flow issue has been corrected. The Corps shall coordinate with ODFW to ensure fish passage monitoring
b. **Project Completion Report.** The Corps will submit, or ensure that the permittee submits, a completion report portion to the NMFS consultation mailbox (consultationupdates.wcr@noaa.gov) within 60 days of the end of construction for the authorized project. Project Completion Report will consist of the following:
    - Actual Start and End Dates for the Completion of In-water Work
    - Turbidity Monitoring/Sampling Records
    - Fish passage shakedown monitoring results.

Attach the following:

- As built drawings.
- Habitat conditions before and after the action is completed.
- Summarized results of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
- Describe any riparian area cleared within 150 feet of OHW.
- Describe turbidity monitoring (by turbidimeter) including dates, times and location of monitoring and any exceedances and steps taken to reduce turbidity observed.
- Describe site restoration.
- Fish removal and relocation report, including:
    - Date(s) conducted
    - Supervisory fish biologist with contact info
    - Methods used for removal
    - Water temperature
    - Air temperature
    - Number juvenile/adults OC coho handled
    - Number juvenile/adults OC coho injured
    - Number juvenile/adults OC coho killed
- Pile driving report, including:
    - Number and size of H-piles driven to support the template
    - Total pairs of sheet pile installed
    - Pairs of sheet pile installed per day
    - Number of days taken to drive sheet piles
    - Time taken to drive each sheet pile pair with vibratory hammer and total time taken to drive all sheet pile pairs with vibratory hammer
    - Number of strikes with impact hammer per sheet pile pair and total number of impact hammer strikes to drive all sheet pile
    - Time taken to proof each sheet pile pair with impact hammer
- Site Restoration Report. The Corps will submit, or ensure that the applicant submits, a report describing site restoration efforts to the NMFS consultation mailbox (consultationupdates.wcr@noaa.gov) within 1 year of the end of restoration activities for the authorized project. Site Restoration Report will consist of the following:
    - Describe the location of the restoration activities.
    - Describe the site restoration elements completed.
    - Site restoration plans/sheets/designs.
    - Site restoration narrative (if applicable).
    - Monitoring and maintenance plan for restoration elements installed.

2.10. Conservation Recommendations

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

1. The Corps and the applicant should consider providing fish passage through the south spillway gates during the three-week reservoir drawdown. Doing so would reduce the number of fish unable to pass during the drawdown, and would reduce the number of fish handled during salvage efforts.
2. The applicant should engage state, federal, and non-governmental partners to commission a thorough study of Winchester Dam to identify the specific effects it has on fish passage, water quality, sediment transport, and other environmental features and/or processes and the beneficial uses the dam and reservoir provide for natural resources and the community as a whole.
3. The dam is no longer used for its original intended purpose of power generation, and has not been used for this purpose for many years. The Corps and applicant should consider the benefits of removing the dam entirely. Restoring the natural flow in this reach of the river would significantly reduce the Water Milfoil issue, which currently dominates the reservoir, and would restore natural processes of gravel transport/deposition, fish migration and rearing, and large wood mobilization.

2.11. Reinitiation of Consultation

This concludes formal consultation for repairs of the Winchester Dam.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency 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."

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

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 physical, biological, and chemical 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 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) 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 [CFR 600.905(b)].

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The proposed action is likely to adversely affect EFH for Pacific Coast salmon, whose EFH is described in (PFMC 2014).

3.2. Adverse Effects on Essential Fish Habitat

Adverse effects on EFH are likely to be realized in following ways:

1. Preconstruction mobilization and surveys may remove vegetation that will reduce or eliminate habitat, and increase turbidity.
2. Construction activities may result in contaminant release from fuel spills, sound pressure waves from pile driving, and increased predation from altered habitats that are preferred by predators.
3. Water quality may be affected by a short-term increase in turbidity.
4. Substrate may be affected by a short-term reduction due to increased compaction and sedimentation.
5. Floodplain connectivity would continue to remain diminished by anthropogenic flow control.
6. Forage may have both a short and long-term decrease due to riparian and channel disturbance, and draining of the reservoir.
7. Natural cover may have a short-term decrease due to riparian and channel disturbance.

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

1. Follow the terms and conditions of the Opinion to minimize adverse impacts on ESA species and critical habitat.
2. Use the opportunity to cooperate with ODFW and NMFS to access the fish ladder to make significant improvements that would remove risk of harm and improve overall fish passage efficiency and survival.
3. Improve riparian habitat in the project vicinity by removing invasive plant species and adding beneficial native plantings to improve riparian habitat.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, for Pacific Coast salmon.

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Corps 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)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5. Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations [50 CFR 600.920(l)].

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion is the Corpst. Other interested users could include the Winchester Water Control District (applicant). Individual copies of this opinion were provided to the Corps. The document will be available at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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