UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

August 29, 2019 **Refer to NMFS No:** WCR-2019-00350

Patricia Grantham
Forest Supervisor
Klamath National Forest
1711 South Main Street
Yreka, California 96097

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the East Fork Scott Project on the Klamath National Forest, Siskiyou County, California

Dear Ms. Grantham:

Thank you for your letter of April 3, 2019, posted on April 11, 2019, and received by NOAA's National Marine Fisheries Service (NMFS) on April 16, 2019, requesting initiation of consultation with NMFS pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the East Fork Scott Project. In this biological opinion (Opinion), NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Southern Oregon Northern California Coast coho salmon. We also concur with the Klamath National Forest's (KNF) determination that the action will likely adversely affect designated critical habitat for Southern Oregon Northern California Coast coho salmon.

As required by section 7 of the ESA, NMFS provides 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 nondiscretionary terms and conditions, including reporting requirements, that the KNF and any person who performs the action must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. NMFS reviewed the likely effects of the proposed action on EFH and concluded that the action would adversely affect the EFH on Pacific Coast Salmon, namely Chinook and coho salmon. Therefore, we have included the results of that review in Section 3 of this document, but have not included EFH conservation recommendations, as ESA terms and conditions contained herein adequately avoid, minimize, and mitigate anticipated adverse effects on EFH.

Please contact Dr. Don Flickinger in Yreka, California at 530-841-4414, Donald.Flickinger@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Regional Administrator
California Coastal Office

Enclosure

cc: Copy to ARN File #151422WCR2019AR00074
Bobbie DiMonte Miller (bdimontemiller@fse.fed.us), USFS, Yreka, CA
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Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

East Fork Scott Project

NMFS Consultation Number: WCRO-2019-00350
Action Agency: U.S. Forest Service, Klamath National Forest

Table 1. Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern Oregon/ Northern California coastal coho salmon (*Oncorhynchus kisutch*)	Threatened	Yes	No	Yes	No

Table 2. Essential Fish Habitat and NMFS' Determinations:

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	No

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

Issued By:

Alecia Van Atta
Regional Administrator
California Coastal Office

Date: August 29, 2019

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LIST OF ABBREVIATIONS USED

ABBREVIATION	**DEFINITION**
BA	Biological Assessment
CDFW	California Department of Fish and Wildlife
DBH	Diameter At Breast Height
EFH	Essential Fish Habitat
ESA	Endangered Species Act
Et seq.	[Latin *Et Sequens*] And The Following One
ESU	Evolutionarily Significant Unit
ITS	Incidental Take Statement
Etc.	[Latin Et Cetera] And Others, Especially Of The Same Kind: And So Forth
KNF	Klamath National Forest
LWD	Large Woody Debris
MSA	Magnuson-Stevens Fishery Conservation And Management Act
NMFS	National Marine Fisheries Service
NSO	Northern Spotted Owl
NTU	Nephelometric Turbidity Units
PBF	Physical and Biological Feature(s)
PCE	Primary Constituent Element(s)
PDF	Project Design Features
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VSP	Viable Salmonid Populations

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

NOAA's 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 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). This Opinion will be available through the National Oceanic and Atmospheric Administration (NOAA) Library Institutional Repository at: https://repository.library.noaa.gov/. A complete record of this consultation is on file at the NMFS Northern California Office in Arcata, California.

1.2 Consultation History

From 2017 through 2018, the Klamath National Forest (KNF) and NMFS level 1 team[1] discussed the Project's proposed action and anticipated effects. During July and August 2017, Level 1 team members conducted field reviews of habitat conditions in the East Fork Scott River watershed, particularly along the East Fork Scott River, as well as Grouse and Big Carmen creeks and other tributaries containing southern Oregon northern California Coast (SONCC) coho salmon critical habitat (*i.e.*, Taylor Creek, Big Mill Creek, Grouse Creek, Kangaroo Creek, Rail Creek, and Houston Creek). During 2018, the KNF interdisciplinary team assigned to analyze the environmental effects and complete National Environmental Policy Act compliance for the Project convened numerous times. On December 5, 2018, the KNF Scott/Salmon Ranger District fisheries biologist provided NMFS a Project Information Letter (PIL) of its intent to undertake a landscape-scale project within the East Fork Scott River watershed, including some project activities occurring along rivers and streams providing critical habitat for the SONCC coho salmon Evolutionarily Significant Unit (ESU). Then on December 19, 2018, the KNF Scott/Salmon Ranger District fisheries biologist provided NMFS with a Project draft Biological Assessment (BA), requesting that it be reviewed. Following the December 2018 - January 2019 federal furlough, NMFS reviewed the Project draft BA, providing comprehensive comments to the KNF on March 8, 2019. NMFS notified the Karuk Tribe that it had undertaken review of the

[1] Level 1 Teams are the core component of a streamlined consultation process. Level 1 Teams are comprised of biologists designated by their respective agencies as team members. Their role is to assist the participating land management agencies in designing programs and activities in such a way as to minimize or avoid adverse impacts to listed species and their habitats (USFS, NMFS, BOR, and USFWS 1999).

Project BA on March 13, 2019. After a second review of comments and edits had been incorporated into the Project BA, NMFS and the KNF jointly agreed on the completeness of the BA's effects analysis and its effects determinations on April 2, 2019.

The KNF subsequently mailed an East Fork Scott Project formal consultation initiation request package, dated April 3, 2019, to NMFS on April 12, 2019, which was received by NMFS on April 16, 2019.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

The KNF proposes to use a variety of silvicultural and restoration techniques to undertake a landscape-scale project (Project) primarily in the East Fork Scott River watershed (Scott River Basin) to: improve forest health and resilience in early and mid to late seral habitat, using both commercial and pre-commercial thinning; restore portions of the Grouse and Big Carmen creek floodplains; enhance meadow and oak woodland habitat for sensitive plants and large game species; reduce sediment input from roads and abandoned mines; protect and enhance riparian and floodplain habitat, and stream shade; and provide for firefighter and public safety. The majority of Project activities will occur within the East Fork Scott River watershed, with two small adjacent drainages also receiving some treatment (Appendix A, Figure A.1). A total of approximately 8,888 acres within the 31,572 acre Project boundary area are proposed for Project treatments. The 5th field watersheds and associated 7th field subwatersheds potentially affected by the Project are: East Fork Scott River 5th field (Callahan–East Fork Scott River, East Fork Scott Headwaters, Grouse Creek, Houston Creek, Kangaroo Creek–East Fork Scott River, Lower Noyes Valley, Mule Creek-East Fork Scott River, and Rail Creek 7th field subwatersheds); French Creek-Scott River 5th field (Facey Gulch-Scott River 7th field subwatershed; and Willow Creek 5th field watershed (Headwaters Willow Creek 7th field subwatershed.

1.3.1 Silviculture – Mid and Late Seral (Commercial) Treatment

The total proposed commercial silvicultural treatment covers approximately 2,365 acres. This treatment is split between tractor-based logging (~1,866 acres) and skyline yarding (~499 acres). Silvicultural prescriptions are designed to promote hardwood retention/regeneration, and to promote/protect northern spotted owl (NSO) habitat wherever it occurs in late successional reserve or NSO critical habitat. Silvicultural treatments vary by unit and have been determined by topographic location, unit objective, tree health, and drought resistance considerations. Treatments within mid- and late-seral conifer forest stands, both plantations and natural stands, involve variable density thinning. Trees larger than 10-inches diameter-at-breast-height (dbh) may be subject to thinning for commercial sale, while smaller trees and brush will be disposed of by hand-piling and pile burning, scattering, and/or chipping.

Commercial thinning in riparian reserves is proposed, where field review has indicated that such treatment is needed to achieve forest health and riparian/aquatic habitat restoration objectives. When thinning in riparian reserves, effective stream shade will be maintained via site-specific thinning prescriptions, no-treatment (*i.e.*, “no-cut”) buffers, and equipment exclusion zones (USFS 2019, Appendix G, Project Design Features).

1.3.2 Silviculture – Early Seral (Pre-Commercial) Treatment

Pre-commercial thinning will occur on approximately 1,499 acres, primarily in plantation stands. Small diameter conifers up to 10-inches dbh will be treated following a variable density thinning prescription, via either mastication or manual felling by chainsaw. Activity fuels will be disposed using hand-piling and pile burning, scattering, and/or chipping. Hardwoods will be included in leave tree spacing prescriptions. When undertaking pre-commercial thinning within riparian reserves, effective stream shade will be maintained by use of site-specific thinning prescriptions, no-treatment (*i.e.*, “no-cut”) buffers, and equipment (masticator) exclusion zones. Masticator arms may reach into exclusion zones to perform treatments, but the body of such equipment will remain outside of designated no-treatment buffers.

1.3.3 Meadow Enhancement

The Project will treat approximately 2,062 acres of meadow habitat, split between wet meadows (~547 acres) and dry meadows (~1,515 acres). To decrease conifer encroachment into meadows, conifers generally less than 10-inches dbh, will be manually thinned within meadows. Conifers located outside of and up to 300 feet from meadow margins will be cut using both manual and mechanical means. As appropriate, broadcast burning may be also be used to remove small conifers or brush within and adjacent to meadow habitat.

To reduce down-cutting of stream channels or sheet erosion within wet meadows, erosion control structures will be manually installed using live vegetation and/or coarse woody debris to encourage soil retention. Roads that pass through/near wet meadows, and that are detrimentally affecting local hydrology, will be provided with improved drainage structures to re-establish more natural hydrologic conditions. No heavy equipment will be used within wet meadows.

1.3.4 Oak Woodland Enhancement

The Project proposes to treat approximately 338 acres of oak woodland. Young conifers, small oaks, and brush encroaching into oak woodland will be manually cut, with masticator use also possible. Conifers less than 10-inches dbh will be removed and small oaks less than 6-inches dbh will be variably thinned. If entry into riparian reserves is necessary, effective stream shade will be maintained by use of site-specific thinning prescriptions, no-cut buffers, and/or equipment exclusion zones.

1.3.5 Legacy Site Treatments

"Legacy" sites are locations that have an elevated level, or demonstrated risk, of erosion resulting from past or existing human activities. Sediment mobilization potential must be great enough to affect water resources for classification as a Legacy site. It must also be feasible to eliminate or minimize sediment inputs from Legacy sites using available equipment and/or techniques, while the cost to accomplish this must not be prohibitive. Legacy sites must be scheduled for treatment in compliance with the Clean Water Act: a condition of the North Coast Regional Water Quality

Control Board waiver of waste discharge requirements. Hundreds of legacy sites were identified throughout the Project area, of which 266 are included in the Project for treatment.

Road Sediment Sources

Treatment of National Forest system roads will include ditch clearing, installation of additional ditch relief culverts, stream crossing culvert replacement, road out-sloping, road surface rocking, and critical and rolling dip placement. Replaced or redesigned road/stream crossing structures will be designed to accommodate 100-year peak storm flows, plus associated wood and debris. Due to the large number of identified legacy sites, primary Project treatments will focus on National Forest system roads 40N03, 40N08, and 41N03, having a combined mileage of approximately 20 miles.

Selected Maintenance Level 1 roads and unauthorized routes will be treated using the following: hydrologic stabilization through the removal of fill from road/stream crossings, outsloping of road surfaces along with localized re-contouring as needed, water bar placement, and the stabilization of over-steepened outboard road prisms.

Non-Road Sediment Sources

Non-road sediment sources within the Project area include: mining ditches south (river left) of mainstem Grouse Creek, between Big Carmen Creek and the KNF boundary; old landings and skid trails within Project silvicultural treatment units; illegal vehicle use impact areas within a meadow at the headwaters of a tributary to Mountain House Creek; abandoned mines; and excessive bank erosion along Grouse Creek and Little Houston Creek. Project sediment source reduction activities are site-specific (see USFS 2019, Appendix B).

1.3.6 Abandoned Mine Reclamation

The Project proposes to treat seven abandoned mine sites. Mine reclamation activities are site specific and include: blocking, gating, or otherwise closing open mine tunnels or pits; removing mining-related debris; and/or removing, re-contouring, or hydrologically stabilizing surface mining features (*e.g.*, tailing piles, dams, unauthorized road segments). Sediment control features will be implemented, as needed. The removal of heavy-metal contaminated soils will also be implemented, as needed.

1.3.7 Large Woody Debris Addition

The Project will add wood to approximately 3.9 miles of Project stream channels, where large wood has been identified as being deficient. The definition of "large wood" is adjustable for the purposes of the Project, and is defined with respect to local stream size. The smaller width and lower power of the majority of headwater streams in the Project area are expected to benefit from the addition of debris, even though it may be smaller than large wood as routinely defined (USFS 2019, Appendix C). Logs or whole trees may be placed within stream channels where large wood is lacking. Trees will be tipped or felled by mechanical equipment, or manually felled using chainsaws. Dependent on site conditions, woody debris may not be anchored or, if anchored, natural materials like driven wooden posts will be used. Trees used as woody debris will be selected so as not to significantly reduce stream shade if cut or tipped, or reduce the integrity and stability of stream banks. Finally, the amount of large wood to be added to stream channels will be site-specific, depending on the amount of large wood already present in stream channels selected for treatment.

- Within selected mid- and late-seral commercial treatment units, entry into riparian reserves to do silvicultural thinning will require that a minimum of 20 percent of the trees that are felled be placed in the adjacent stream channel. In all Project commercial harvest units, approximately one linear mile of streams has been identified for such Riparian Reserve entry and treatment.
- Outside of Project commercial units, approximately 2.9 linear miles of stream have been identified for large woody debris (LWD) treatment (USFS 2019, Appendix A).

1.3.8 Improved Passage at Road/Stream Crossings

The Project identified 16 road/stream crossings for treatment to benefit aquatic organisms, improving their passage. As appropriate, these crossings will be upgraded and/or reconstructed to remove barriers and enhance connectivity. Four of these 16 road/stream crossings are within designated SONCC coho salmon critical habitat and/or range of anadromy:

- EF Scott River – National Forest 41N06 road – culvert: partial barrier,
- Grouse Creek – National Forest 40N03 road – ford: partial barrier,
- Crater Creek – National Forest 41N06 road – culvert: complete barrier,
- "Little Crater Creek" – National Forest 41N06 road – ford: partial barrier.

1.3.9 Grouse and Big Carmen Creeks Floodplain Restoration

The Project includes the restoration of floodplain processes in lower Grouse and Big Carmen creeks, by resetting/restoring natural floodplain activation and characteristics. The proposed treatment area is 1.1 linear stream miles, including Grouse Creek from the 40N03 ford downstream to the Forest Service boundary (0.8 miles) and the lower 0.3 mile of Big Carmen Creek. The entire riparian reserve corridor on both sides of the current Grouse and Big Carmen creek channels may be affected by Project floodplain restoration activities.

Historical mining has degraded Grouse and Big Carmen creeks by restricting stream flow access to floodplains, causing stream incision, channelization/channel simplification, and loss of habitat. The objective(s) of floodplain restoration include cessation of chronic sediment discharge due to excessive bank erosion, restoration of fish habitat and fish passage, protection/enhancement of cold water, and detention of water and fine sediment within the restored floodplain. This latter objective will help buffer heavier and warmer precipitation events, as well as extreme wet and dry periods (DWR 2017) that are projected with climate change. The activities proposed to meet these objectives will follow the "Stage 0" restoration concept and its associated techniques, and may include the following:

- Pre-implementation installation of monitoring equipment, including rain gauges, groundwater wells, and stream discharge gages;

- Grading and (re)contouring floodplain surfaces to a designed geomorphic grade line within the historic 100-year floodplain, primarily to the north of the extant Grouse Creek channel. The total floodplain area to be affected is approximately 86 acres, of which 40 acres will be subject to ground disturbance;
- Filling the extant incised channels of Grouse and Big Carmen creeks to a designed geomorphic grade line. Fill material will be derived from berms and tailings piles, large wood, and other locally sourced floodplain alluvium. If more material is needed, perennial ponds will be excavated within the floodplain. The Project floodplain restoration design will require no more than one-tenth base flow to connect these perennial ponds to the main creek channels;
- Crushing of tailing pile material to decrease pile volume while creating gravel, and then introduction of such gravel into Grouse Creek to improve/increase salmonid spawning habitat;
- Addition of large wood to restored floodplain surfaces. Large wood will include single trees and engineered log jams. Large wood will be sourced within adjacent riparian reserves. At least 400 pieces of wood are to be used in floodplain restoration work;
- Obliteration of all non-system roads, unauthorized routes, and temporary roads; and
- Planting native riparian vegetation.

In addition to the “Stage 0” floodplain restoration described above, the following may also be undertaken:

- The creation of a primary channel on the floodplain surface, by excavating the floodplain and installing natural materials there to create a more stable channel.
- Creation and enhancement of side-channels, including placement of natural channel bed materials to increase habitat complexity.

1.3.10 Little Houston Creek Channel Restoration

The Project proposes to reverse excessive channel incision along 0.5 mile of Little Houston Creek, by encouraging sediment deposition. The treatment area is on KNF-managed land immediately upstream and downstream from the 41N06 road/stream crossing over Little Houston Creek. Project activities occurring there include whole tree placement and tipping of trees into the Little Houston Creek channel. Existing trees, located greater than 100 feet from the active Little Houston Creek channel, will be selected for whole tree tipping. There will be no diameter limit for trees selected for tipping, but the healthiest and most dominant trees will not be tipped/removed. Recently dead or diseased trees will be prioritized for whole tree tipping. Whole trees with root wads will be placed into the Little Houston Creek channel to form LWD jams of at least four pieces each. The linear stream distance between such debris jams will be approximately 100 feet. Pieces may be anchored or keyed into banks to increase stability, and to also encourage subsequent capture of naturally mobilized large and small wood.

1.3.11 Fuel Treatment on Private Land

The Project proposes fuels treatments on approximately 56 acres of private land having houses and/or outbuilding structures. Conifers less than 10-inches dbh, hardwood clumps, and brush will be thinned to variable spacing/density, by manual felling with chainsaws, mechanical felling with heavy equipment, chipping, or by mastication. Trees larger than 10-inches dbh may be thinned, where such treatment reduces the potential for crown fire. These larger trees may be manually or mechanically felled, with heavy equipment then moving them to adjacent landings. Trees not thinned will be limbed to seven feet in height, to reduce ladder fuels. When treating riparian reserves, effective stream shade will be maintained using site-specific thinning prescriptions, no-cut buffers, and/or equipment exclusion zones.

1.3.12 Underburning and Broadcast Burning

The Project will underburn and/or broadcast burn approximately 1,236 acres. This acreage includes commercial treatment/variable density thinning, pre-commercial treatment/thinning, and meadow/oak enhancement units, as well as the landscape between such units. Ridgetop, slopes, and riparian areas, including riparian reserves adjacent to fish-bearing streams, may be underburned. Depending on the site within the Project area, underburning may either be the primary activity, or will be employed in a secondary function, to dispose of Project-generated fuels. Best Management Practices and resource protection measures (USFS 2019, Appendix G) will be followed for all Project prescribed burning in riparian reserves.

1.3.13 Hazard Tree Treatment

The Project will fell and, in some cases, remove hazard trees along approximately 30 linear miles of roads, as well as locations near campground, trailheads, and dispersed camp sites. The Project hazard tree treatment area is defined at 150 feet on each side of roads. Hazard trees will be identified, felled, and removed in accordance with “Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region” (USFS 2012). Trees identified as having moderate to high hazard potential will be selected for either mechanical or manual felling. Removal of merchantable roadside hazard trees will include the use of ground-based and cable logging systems. In general, most hazard trees cut within riparian reserves will be left in place on the ground, as long as safety and infrastructure will not be compromised (USFS 2019, Appendix G, Project Design Features). Effective stream shade will be maintained.

1.3.14 Temporary Roads and Landings

The Project will reopen approximately 11 miles of existing roadbed for short-term access/use, while an additional four miles of new road will be constructed for temporary use. These temporary roads will generally be used for silvicultural treatment activities. However, approximately one mile of temporary road on existing roadbed, and two miles of new temporary road, will be used in support of stream/floodplain restoration activities. No roads will be added to the National Forest transportation system. At Project completion, all temporary roads will be blocked and hydrologically stabilized, as appropriate. Stabilization activities may include:

- Removal of culverts;

- Re-establishment of channel crossings to a slope and form that mimics natural conditions;
- Installation of dips, water bars, and other run-off control features;
- Removal of inside ditches; and
- Blocking routes to motorized vehicle use via a combination of earthen berms and placement of boulder barricades.

The Project includes construction of approximately 24 new landings. The maximum size for each new landing is 0.5 acre, but they will generally be smaller. New Project landings will not be placed within riparian reserves. Most existing landings selected for Project use will be located outside riparian reserves, and those located within riparian reserve must be further than 50 feet from a break in slope to any stream channel or inner gorge. Wherever possible, skyline yarding landings will operate from roads prisms. Any additional existing or new landings that may be used in the Project will be identified and evaluated based on topography, need, and discussion(s) between KNF personnel and logging operators. NMFS will be notified of any additional Project landings. Any such additional landings will be subject to all Project guidelines/restrictions applicable to landings. All Project landings will be configured for long-term drainage and hydrological stability after use.

1.3.15 Road Closures and Road Decommissioning

The Project included a risk and benefit travel analysis for all National Forest system roads affected by the Project. The assessment found that some roads within the Project area had a high risk of negatively affecting resources, particularly water quality. Recommendations developed through this travel analysis have been incorporated into the Project proposed action, including 2.3 miles of road decommissioning (USFS 2019, Appendix B).

1.3.16 Water Drafting and Dust Abatement

The Project has identified 24 established water drafting sites to be used for dust abatement. Eight of these 24 water drafting sites are located within fish-bearing waters. These eight sites are:

- Grouse Creek – Forest Road 40N03 and 40N12;
- Kangaroo Creek – Forest Road 40N23;
- Cabin Meadow Creek – Forest Road 41N04;
- Rail Creek – Forest Road Forest Road 41N08; and
- Rock Fence Creek – Forest Road 41N08, 41N08A, and 40N18A.

The three Grouse Creek and Kangaroo Creek sites are the only Project water drafting sites within anadromy, including SONCC coho salmon critical habitat. Additional water drafting sites may be designated during Project operations, as needed, with the approval of a fisheries biologist. All Project water drafting in anadromous waters will be implemented according to NMFS Water Drafting Specifications (NOAA 2001b), along with other applicable Best Management Practices (USFS 2019, Appendix G).

1.3.17 Slash and Debris Treatment

Slash and woody debris will be generated during Project silvicultural treatments, meadow and oak woodland enhancement, hazard tree abatement, and fuel reduction. Disposal of this material will include piling/burning, lop and scatter, chipping, mastication, and/or removal to a landing location. Larger material placed on landings will be made available for firewood, or sold for commercial use. When pile burning, fire may be allowed to spread between piles as low intensity ground fire when fuel and weather conditions permit, to help consume additional fine fuels while helping restore a more natural fire regime.

1.3.18 Resource Protection Measures

The proposed action includes Project Design Features designed to avoid and/or minimize potential adverse environmental effects (USFS 2019, Appendix G). The Project fisheries biologist and other watershed specialists developed the Project Design Features for watershed protection, and their implementation is necessary to avoid and/or minimize adverse effects to aquatic habitat and SONCC coho salmon, in both the short and long term. Appendix G (USFS 2019) includes all Project erosion control, fuel/oil spill containment, and other water quality control measures designed to protect aquatic resources.

Riparian Reserves are a Forest Management Area, or land allocation, designated in the KNF Land and Resource Management Plan (USFS 1995) to provide protection to aquatic ecosystems and adjacent upland areas that directly affect them. Hydrologic riparian reserves are areas having specified stream buffer widths, the delineation of which are defined based on fish occupancy and waterbody type (*e.g.*, permanent stream, intermittent/ephemeral stream, lake/pond). The width of riparian reserves is then determined using a measure of site potential tree height or slope distance to stream bodies, whichever is greater. One site potential tree for the Project is defined as 150 feet. Within the Project area, all fish-bearing streams have an adjacent riparian reserve management zone width of two site potential trees, or 300 feet, on either side of stream channels. Non fish-bearing intermittent and perennial streams have an adjacent riparian reserve management zone width of one site potential tree, or 150 feet, on either side of stream channels.

Wet Weather Operation Standards (USFS 2002) are included within Best Management Practices and Project Design Features, and will be used to guide all Project operations during periods of wet weather at any time of the year (USFS 2019, Appendix G).

1.3.19 Project Implementation Timing

With the exception of underburning activities, which may occur within prescription at any time, Wet Weather Operation Standards (2002) will guide/restrict when thinning, fuel reduction, and roadwork/legacy site treatment activities may occur. NMFS will be provided with an extended weather forecast for the proposed Project operations interval, along with a description of the Project work to be done. Instream work within fish-bearing stream segments, including Grouse Creek/Big Carmen Creek floodplain restoration, water drafting, and crossing/culvert reconstruction will be allowed from June 15th through October 15th each year. If the Grouse/Big Carmen creeks floodplain restoration work has not been completed by October 15th, and fair weather is expected to continue, NMFS will be provided with an extended weather forecast along with a request to extend this floodplain restoration work until its completion. Elsewhere in the Project area, approved instream actions (*e.g.*, LWD addition, water drafting in non-fish-bearing streams) may occur year-round, as appropriate for the specific Project activity.

1.3.20 Interrelated and Interdependent Actions

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). Due to the comprehensive manner in which activities have been included in the proposed action described above, NMFS does not anticipate any interrelated or interdependent actions associated with the proposed action.

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214 (February 11,2016)).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features.

In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a Reasonable and Prudent Alternative to the proposed action.

2.1.1 Overview of NMFS' Assessment Framework

NMFS uses a series of sequential analyses to assess the effects of federal actions on endangered and threatened species and designated critical habitat. The first analysis identifies those physical, chemical, or biotic aspects of the proposed action that are likely to have individual, interactive, or cumulative direct and indirect effect on the environment (NMFS uses the term "potential stressors" for these aspects of an action). As part of this step, NMFS identifies the spatial extent of any potential stressors and recognizes that the spatial extent of those stressors may change with time (the spatial extent of these stressors is the "action area" for a consultation) within the action area.

The second step of the analyses starts by determining whether a listed species is likely to occur in the same space and at the same time as these potential stressors. If NMFS concludes that such co-occurrence is likely, NMFS then estimates the nature of that co-occurrence (these represent the exposure analyses). In this step of the analyses, NMFS identifies the number and age (or life stage) of the individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent.

Once NMFS identifies which listed species and its life stage(s) are likely to be exposed to potential stressors associated with an action and the nature of that exposure, NMFS determines whether and how those listed species and life stage(s) are likely to respond given their exposure (these represent the response analyses). The final steps of NMFS' analyses are establishing the risks those responses pose to listed species and their life stages.

2.1.1.1 Risk Analysis for Endangered and Threatened Species

NMFS' jeopardy determination must be based on an action's effects on the continued existence of the listed species, which can include true biological species, subspecies, or distinct population segments of vertebrate species. Because the continued existence of listed species depends on the fate of the populations that comprise them, the viability (that is, the probability of extinction or probability of persistence) of listed species depends on the viability of the populations that comprise the species. Similarly, the continued existence of populations are determined by the fate of the individuals that comprise them; populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce (or fail to do so).

NMFS' risk analyses reflect these relationships between listed species and the populations that comprise them, and the individuals that comprise those populations. NMFS identifies the probable risks that actions pose to listed individuals that are likely to be exposed to an action's effects. NMFS then integrates those individuals' risks to identify consequences to the populations those individuals represent. NMFS' analyses conclude by determining the consequences of those population-level risks to the species those populations comprise.

NMFS measures risks to listed individuals using the individual's reproductive success which integrates survival and longevity with current and future reproductive success. In particular, NMFS examines the best available scientific and commercial data to determine if an individual's probable response to stressors produced by an action would reasonably be expected to reduce the individual's current or expected future reproductive success by one or more of the following: increasing the individual's likelihood of dying prematurely; having reduced longevity; increasing the age at which individuals become reproductively mature; reducing the age at which individuals stop reproducing; reducing the number of live births individuals produce during any reproductive event; reducing the number of times an individual is likely to reproduce over its reproductive lifespan (in animals that reproduce multiple times); or causing an individual's progeny to experience any of these phenomena (Stearns 1992, McGraw and Caswell 1996, Newton and Rothery 1997, Brommer et al. 1998, Clutton-Brock 1998, Brommer 2000, Brommer et al. 2002, Roff 2002, Oli and Dobson 2003, Turchin 2003, Kotiaho et al. 2005, Coulson et al. 2006).

When individuals of a listed species are expected to have reduced future reproductive success or reductions in the rates at which they grow, mature, or become reproductively active, NMFS would expect those reductions, if many individuals are affected, to also reduce the abundance, reproduction rates, and growth rates (or increase variance in one or more of these rates) of the populations those individuals represent (Stearns 1992). Reductions in one or more of these variables (or one of the variables NMFS derives from them) is a necessary condition for increasing a population's extinction risk, which is itself a necessary condition for increasing a species' extinction risk.

NMFS equates the risk of extinction of the species with the "likelihood of both the survival and recovery of a listed species in the wild" for purposes of conducting jeopardy analyses under section 7(a)(2) of the ESA because survival and recovery are conditions on a continuum with no bright dividing lines. Similar to a species with a low likelihood of both survival and recovery, a species with a high risk of extinction does not equate to a species that lacks the potential to become viable. Instead, a high risk of extinction indicates that the species faces significant risks from internal and external processes and threats that can drive a species to extinction. Therefore, NMFS' jeopardy assessment focuses on whether a proposed action appreciably increases extinction risk, which is a surrogate for appreciable reduction in the likelihood of both the survival and recovery of a listed species in the wild.

On the other hand, when listed species exposed to an action's effects are not expected to experience adverse effects, NMFS would not expect the action to have adverse consequences on the extinction risk of the populations those individuals represent or the species those populations comprise (Mills and Beatty 1979, Stearns 1992, Anderson 2000). If NMFS concludes that listed species are not likely to be adversely affected, NMFS would conclude the assessment.

2.1.1.2 Effects Analysis for the SONCC coho salmon ESU

For the SONCC coho salmon ESU, the effects analysis is based on a bottom-up hierarchical organization of individual fish at the life stage scale, population, diversity stratum, and ESU. The guiding principle behind this effects analysis is that the viability of a species (*e.g.*, ESU) is dependent on the viability of the diversity strata that compose that species; the viability of a diversity stratum is dependent on the viability of most independent populations that compose that stratum and the spatial distribution of those viable populations; and the viability of the population is dependent on the fitness and survival of individuals at the life stage scale. The SONCC coho salmon ESU life cycle includes the following life stages and behaviors, which will be evaluated for potential effects resulting from the proposed action: adult migration, spawning, embryo incubation, juvenile rearing, and smolt outmigration.

2.1.1.3 Viable Salmonid Populations Framework for Coho Salmon

In order to assess the status, trend, and recovery of any species, a guiding framework that includes the most appropriate biological and demographic parameters is required. For Pacific salmon, McElhany et al. (2000) defined a viable salmonid population (VSP) as an independent population that has a negligible probability of extinction over a 100-year time frame. The VSP concept provides guidance for estimating the viability of populations and larger-scale groupings of Pacific salmonids such as an ESU or Distinct Population Segment (DPS). Four VSP parameters form the key to evaluating population and ESU/DPS viability: (1) abundance; (2) productivity (*i.e.*, population growth rate); (3) population spatial structure; and (4) diversity (McElhany et al. 2000). Therefore, these four VSP parameters were used to evaluate the extinction risk of the SONCC coho salmon ESU.

Population size provides an indication of the type of extinction risk that a population faces. For instance, smaller populations are at a greater risk of extinction than large populations because the processes that affect populations operate differently in small populations than in large populations (McElhany et al. 2000). One risk of low population sizes is depensation. Depensation occurs when populations are reduced to low densities and per capita growth rates decrease as a result of a variety of mechanisms [*e.g.*, failure to find mates and therefore reduced probability of fertilization, failure to saturate predator populations (Liermann and Hilborn 2001)]. While the Allee effect (Allee et al. 1949) is more commonly used in general biological literature, depensation is used here because this term is most often used in fisheries literature (Liermann and Hilborn 2001). Depensation results in negative feedback that accelerates a decline toward extinction (Williams et al. 2008).

The productivity of a population (i.e., production over the entire life cycle) can reflect conditions (*e.g.,* environmental conditions) that influence the dynamics of a population and determine abundance. In turn, the productivity of a population allows an understanding of the performance of a population across the landscape and habitats in which it exists and its response to those habitats (McElhany et al. 2000). In general, declining productivity can lead to declining population abundance. Understanding the spatial structure of a population is important because the spatial structure can affect evolutionary processes and, therefore, alter the ability of a population to adapt to spatial or temporal changes in the species' environment (McElhany et al. 2000).

Diversity, both genetic and behavioral, is critical to success in a changing environment. Salmonids express variation in a suite of traits, such as anadromy, morphology, fecundity, run timing, spawn timing, juvenile behavior, age at smolting, age at maturity, egg size, developmental rate, ocean distribution patterns, male and female spawning behavior, and physiology and molecular genetic characteristics. The more diverse these traits (or the more these traits are not restricted), the more diverse a population is, and the more likely that individuals, and therefore the species, would survive and reproduce in the face of environmental variation (McElhany et al. 2000). However, when diversity is reduced due to loss of entire life history strategies or to loss of habitat used by fish exhibiting variation in life history traits, the species is in all probability less able to survive and reproduce given environmental variation. Because some of the VSP parameters are related or overlap, the evaluation is at times unavoidably repetitive. Viable ESUs are defined by some combination of multiple populations, at least some of which exceed "viable" thresholds, and that have appropriate geographic distribution, resiliency from catastrophic events, and diversity of life histories and other genetic expression.

A viable population (or species) is not necessarily one that has recovered as defined under the ESA. To meet recovery standards, a species may need to achieve greater resiliency to allow for activities such as commercial harvest and the existing threat regime would need to be abated or ameliorated as detailed in a recovery plan. Accordingly, NMFS evaluates the current status of the species to diagnose how near, or far, the species is from a viable state because it is an important metric indicative of a self-sustaining species in the wild. However, NMFS also considers the ability of the species to recover in light of its current condition and the status of the existing and future threat regime. Generally, NMFS folds this consideration of current condition and ability to recover into a conclusion regarding the "risk of extinction" of the population or species.

NMFS uses the concepts of VSP as an organizing framework in this opinion to systematically examine the complex linkages between the proposed action effects and VSP parameters while also considering and incorporating natural risk factors such as climate change and ocean conditions. These VSP parameters are important to consider because they are predictors of extinction risk, and the parameters reflect general biological and ecological processes that are critical to the growth and survival of coho salmon (McElhany et al. 2000). These four parameters are consistent with the "reproduction, numbers, or distribution" criteria found within the regulatory definition of jeopardy (50 CFR 402.02) and are used as surrogates for numbers, reproduction, and distribution. The fourth VSP parameter, diversity, relates to all three jeopardy criteria. For example, numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained, resulting in reduced population resilience to environmental variation at local or landscape-level scales.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of SONCC coho salmon that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. This opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

2.2.1 Species Description and General Life History

SONCC coho salmon have a generally simple three-year life history. The adults typically migrate from the ocean and into bays and estuaries towards their freshwater spawning grounds in late summer and fall, and spawn by mid-winter. Adults die after spawning. The eggs are buried in nests, called redds, in the rivers and streams where the adults spawn. The eggs incubate in the gravel until fish hatch and emerge from the gravel the following spring as fry. Fish typically rear in freshwater for about 15 months before migrating to the ocean. The juveniles go through a physiological change during the transition from fresh to salt water called smoltification. Coho salmon typically rear in the ocean for two growing seasons, returning to their natal streams as 3-year-old fish to renew the cycle.

2.2.2 Status of Species and Critical Habitat

In this Opinion, NMFS assesses four population viability parameters to help us understand the status of each species and their ability to survive and recover. These population viability parameters are: abundance, population productivity, spatial structure, and diversity (McElhany et al. 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information, including the Recovery Plan for SONCC Coho Salmon (NMFS 2014) and the most recent status review for SONCC coho salmon (Williams et al. 2016a) to determine the general condition of each population and factors responsible for the current status of the ESU. We use these population viability parameters as surrogates for reproduction, numbers, and distribution; the criteria found within the regulatory definition of "jeopardize the continued existence of" (50 CFR 402.02). This Opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

2.2.2.1 Status of SONCC Coho Salmon

2.2.2.1.1 SONCC Coho Salmon Abundance and Productivity

Although long-term data on coho salmon abundance are scarce, the available evidence from short-term research and monitoring efforts indicate that spawner abundance has declined since the previous status review (Williams et al. 2011) for populations in this ESU (Williams et al. 2016b). In fact, most of the 30 independent populations in the ESU are at high risk of extinction because they are below or likely below their depensation threshold, which can be thought of as the minimum number of adults needed for survival of a population. The productivity of a population (*i.e.*, production over the entire life cycle) can reflect conditions (*e.g.*, environmental conditions) that influence the dynamics of a population and determine abundance. In general, declining productivity equates to declining population abundance. Available data show that the 95 percent confidence intervals for the slope of the regression line include zero for many populations in the SONCC coho ESU, indicating that whether the productivity is decreasing, increasing, or stable cannot be determined (McElhany et al. 2000, NMFS 2014).

2.2.2.1.2 SONCC Coho Salmon Spatial Structure and Diversity

The distribution of SONCC coho salmon within the ESU is reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which SONCC coho salmon are now absent (NMFS 2001, Good et al. 2005, Williams et al. 2011, Williams et al. 2016b). Extant populations can still be found in all major river basins within the ESU (70 FR 37160 (June 28, 2005)). However, extirpations, loss of brood years, and sharp declines in abundance (in some cases to zero) of SONCC coho salmon in several streams throughout the ESU indicate that the SONCC coho salmon's spatial structure is more fragmented at the population-level than at the ESU scale. In spite of recent SONCC coho salmon spawning activity in strongholds like the Klamath River tributaries of Horse, Middle, and Seiad creeks (Dennis et al. 2019), the genetic and life history diversity of populations of SONCC coho salmon is generally low and is inadequate to contribute to a viable ESU, given the significant reductions in abundance and distribution.

2.2.2.2 Status of Critical Habitat

In designating critical habitat for the SONCC coho salmon ESU, NMFS identified the following five essential habitat types (PBFs): (1) juvenile summer and winter rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049 (May 5, 1999)). The condition of SONCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human induced factors affecting critical habitat: overfishing, artificial propagation, logging, agriculture, mining, urbanization, stream channelization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp et al. 1995, 70 FR 37160 (June 28, 2005), 64 FR 24049 (May 5, 1999)). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

2.2.2.3 Factors Related to the Decline of Species and Degradation of Critical Habitat

The factors, many of which are noted above under *Status of Critical Habitat*, that caused declines include hatchery practices, ocean conditions, habitat loss due to dam building, degradation of freshwater habitats due to a variety of agricultural and forestry practices, water diversions, urbanization, over-fishing, mining, climate change, and severe flood events exacerbated by land use practices (Good et al. 2005, Williams et al. 2016a). Sedimentation and loss of spawning gravels associated with poor forestry practices and road building are particularly chronic problems that can reduce the productivity of salmonid populations. Late 1980s and early 1990s droughts and unfavorable ocean conditions were identified as further likely causes of decreased abundance of SONCC coho salmon (Good et al. 2005). From 2014 through 2016, the drought in California reduced stream flows and increased temperatures, further exacerbating stress and disease. Ocean conditions have been unfavorable in recent years (2014 to present) due to both the El Nino in 2015 and 2016, and the existence of a northeast Pacific marine warming phenomenon, in 2013 through 2015, referred to as “the blob” (Cavole et al. 2016). Reduced flows can cause increases in water temperature, resulting in increased heat stress to fish and thermal barriers to migration.

New information since this SONCC coho salmon ESU was listed suggests that the earth’s climate is warming, and that this change could significantly impact ocean and freshwater habitat conditions (Intergovernmental Panel on Climate Change (IPCC) 2014), which affects survival of coho salmon. Of all the Pacific salmon species, coho salmon are likely one of the most sensitive to climate change due to their extended freshwater rearing. Additionally, the SONCC coho salmon ESU is near the southern end of the species’ distribution and many populations reside in degraded streams that have water temperatures near the upper limits of thermal tolerance for coho salmon.

Average annual air temperatures in the Pacific Northwest have increased by approximately 1°C since 1900, or about 50 percent more than the global average warming over the same period (Independent Scientific Advisory Board (ISAB) 2007). The latest climate models project a warming of 0.1°C to 0.6°C per decade over the next century. According to the ISAB’s recurring reports (https://www.nwcouncil.org/fw/isab/), these effects may have the following physical impacts within approximately the next 40 years:

- Warmer air temperatures will result in a shift to more winter/spring rain and runoff, rather than snow that is stored until the spring/summer melt season;
- With a shift to more rain and less snow, snowpack will diminish in those areas that typically accumulate and store water until the spring/summer melt season;
- With a smaller snowpack, these watersheds will see their runoff diminished and exhausted earlier in the season, resulting in lower stream flows in the June through

September period; and

- River flows in general and peak river flows are likely to increase during the winter due to more precipitation falling as rain rather than snow.

For northern California and southern Oregon, most models project heavier and warmer precipitation. Extreme wet and dry periods are projected, increasing the risk of both flooding and droughts (California Department of Water Resources 2013). Annual precipitation could increase by up to 20 percent over northern California. A greater proportion of precipitation events occurring during the mid-winter months is likely to occur as intense rain and rain-on-snow events that are likely to lead to higher numbers of landslides and greater and more severe floods (Luers et al. 2006, Doppelt et al. 2008). Overall, there will be earlier and lower low-flows and earlier and higher high-flows. Increased flooding is likely to scour salmon eggs from redds and displace overwintering juveniles, while lower low flows are likely to increase summer water temperatures and decrease available salmon habitat.

Water temperature is likely to increase overall, with higher maximum temperatures along with higher minimum temperatures in streams. Increases in winter and spring temperature regimes are likely to include, but are not limited to, depletion of cold water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, increased bio-energetic and disease stresses on fish, and increased competition among species. In addition, the increase in summer water temperatures are likely to be especially dramatic since flows in many streams are expected to continue decreasing as a result of decreasing snowpack (Luers et al. 2006, Crozier et al. 2008, Doppelt et al. 2008, Crozier 2016). This loss of snowpack will continue to create lower spring and summertime flows while additional warming will cause earlier onset of runoff in streams.

Marine ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Feely 2004, Osgood 2008, Turley 2008, Abdul-Aziz et al. 2011, Doney et al. 2012). These changes are likely to have deleterious impacts on coho salmon growth and survival while at sea. Ocean acidification also has the potential to affect the phytoplankton community due to the likely loss of most calcareous shell-forming species such as pteropods (Crozier 2016). Related direct effects to coho salmon likely include decreased growth rates due to ocean acidification and increased metabolic costs due to the rise in sea surface temperature (Portner and Knust 2007).

The threat to coho salmon from global climate change will increase in the future. In general, conditions in the climate and within the ecosystems on which coho salmon rely will change dramatically over the next several decades. Climate change is having, and will continue to have, an impact on salmonids throughout the Pacific Northwest and California (Crozier 2016). Overall, climate change represents a growing threat for the SONCC coho salmon ESU, and will challenge the resilience of coho salmon (NMFS 2014).

2.3 Action Area

"Action area" means all drainages potentially affected by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). This encompasses all drainages where Project activities occur along the East Fork Scott River, as well as the mainstem Scott River downstream from Callahan, California, to Messner Gulch. The Scott River-Messner Gulch confluence is the downstream junction where all potential Project effects, including those resulting from Hayden Ridge treatment activities, enter the stream network. Potential effects to SONCC coho salmon and associated critical habitat will be assessed for all stream reaches positioned between Project activities and SONCC coho salmon critical habitat downstream to the Scott River-Messner Gulch confluence (Appendix A, Figure A.1).

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

While the Status of SONCC coho salmon section (Section 2.2.2.1) discussed the viability of the SONCC coho salmon ESU as a whole, this section will focus on the condition of SONCC coho salmon and their critical habitat in the action area, and factors affecting their condition within the action area. The action area includes all drainages where Project activities occur along the East Fork Scott River, continuing downslope and downstream to the confluence of the East Fork Scott River with the South Fork Scott River, and then continuing further downstream to the confluence of the Scott River with Messner Gulch, where all potential Project effects enter the stream network.

Coho salmon were once numerous and widespread within the Klamath River basin (Snyder 1931). Today, due to migration barriers, habitat degradation, and other factors, the small populations that remain occupy a fraction of their historical area, in limited habitat within Klamath tributary watersheds (*i.e.*, Scott River, Shasta River, Horse Creek, and Seiad Creek) and the mainstem Klamath River just below Iron Gate Dam (National Research Council (NRC) 2004). In recent years, the highest recorded escapement of adult coho salmon in the action area has been to the Scott River sub-basin, where the Scott River population of coho salmon is considered to be at moderate risk of extinction (NMFS 2014).

Coho salmon in the action area occupy the East Fork Scott River (Magranet and Yokel 2017). Though spawning surveys in Grouse Creek in winter 2002, 2004-2007, 2012, and 2014 failed to locate either coho salmon redds or carcasses (USFS 2019), coho salmon are able to access the lower reaches of the larger tributaries to the East Fork Scott River (*i.e.*, Grouse Creek, Taylor Creek, Big Mill Creek, Kangaroo Creek, Rail Creek, and Houston Creek).

2.4.1 <u>Status of Critical Habitat in the Action Area</u>

Here, NMFS describes overarching water quality conditions in the action area.

2.4.1.1 Water Quality Conditions

The Scott River Basin is currently listed as water-quality impaired under section 303(d) of the Clean Water Act (California Regional Water Quality Control Board (CRWQCB) 2014), including: water temperature and sedimentation/siltation in the entire water body except for Mill Creek (tributary to Etna Creek) and Canyon Creek; and aluminum, dissolved oxygen (DO), pH, and biostimulatory conditions. Biostimulatory conditions are the result of excess nutrients in the system, leading to excessive algal growth. These conditions are observed in diel patterns for DO and pH that impair beneficial uses and chlorophyll a concentrations in the water column. Temperature, channel configuration, flow, and riparian cover can also impact biostimulatory conditions. Impaired water quality within both mainstem Scott River and tributary reaches are often stressful to juvenile and adult coho salmon during late spring, summer, and early fall months. The Scott TMDL identifies flow as a causative factor related to elevated water temperatures, but does not identify specific flow objectives necessary to attain or maintain water quality objectives. (https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/pdf/150710/04_NorthCoastRegion_2012IntegratedReportStaffReport.pdf).

2.4.1.2 Water Temperature, Dissloved Oxygen, Nutrients, and Sediment

Unsuitable water temperature is one of the most widespread and significant stresses in the SONCC coho salmon ESU (Williams et al. 2016a), and is a recognized stressor seasonally throughout the action area. Optimal water, sub-optimal, and lethal temperatures for coho salmon are lifestage specific (California Department of Water Resources (DWR) 2004, Carter 2005). Stenhouse et al. (2012) reviewed water temperature thresholds and optima for coho salmon in the action area and identified an optimal water temperature range for rearing juvenile coho salmon to be 8°C to 15.6°C. Temperatures above this optimal range are associated with higher disease incidence and increased predation. NMFS (2014) identifies 19°C as the upper limit for coho salmon suitability and 25°C as the lethal threshold for juvenile coho salmon.

Water temperatures in the Scott River Basin vary seasonally and by location, but summer water temperatures in the mainstem Scott River regularly exceed 19°C, and are often above 22°C (Siskiyou RCD 2019, Robinson 2017). Tributaries to the Scott River tend to be cooler than the mainstem Scott River during summer months, but regularly sustain maximum moving weekly average temperatures (MWAT) that exceed 18.5°C. For example, the East Fork Scott River had MWATs that fluctuated between 21.6°C and 22.9°C during the 2012 to 2018 interval, while MWATs for Grouse Creek fluctuated between 17.9°C to 19.6°C during the same interval. Kangaroo Creek was decidedly cooler, with MWATs for that interval fluctuating between 12.4°C to 15.7°C (Robinson 2013, Robinson 2017).

As with temperature, optimal and sub-optimal levels of DO are life stage specific for coho salmon (Carter 2005). In addition, there is an interaction effect among DO and other stressors, including water temperature and turbidity. Carter (2005) reviewed effects of various DO concentrations on salmonids and identified a minimum of 6 mg/L DO before production impairment was observed for most life stages, and a minimum 3 mg/L DO for acute mortality. Dissolved oxygen daily averages have been measured in the Shackleford Creek Basin and at the Scott River USGS gage, since 2007. At both locations, DO fluctuates diurnally between 12 and 7 mg/L during the summer, reaching its lowest level during summer nights. DO increases and stabilizes between 11 and 12 mg/L during the winter (Robinson 2013, Robinson 2017).

Primary nutrients, including nitrogen and phosphorus, are affected by the geology of the surrounding watershed of the Scott River, upland productivity and land uses, and a number of physical processes affecting aquatic productivity within riverine reaches. An overabundance of these nutrients in the water can lead to toxic algal blooms and reduced dissolved oxygen levels when water temperatures rise. In 2013, total nitrogen concentrations in surface water of the East

Fork Scott River were stable around 0.12 mg/L in the spring, and then gradually declined through the summer and fall (Robinson 2013). A similar trend was recorded for total phosphorus in the East Fork Scott River, remaining stable below 0.01 mg/L and then declining slightly through the summer (Robinson 2013). Also, potential Hydrogen ion (pH) levels have been reported as poor in lower Scott River (*i.e.*, 6 to 7 in the Shackleford Creek Basin (Robinson 2013)), but fair where the lower Scott Valley enters the Scott River Canyon (NMFS 2014). The lowest pH values routinely occur during the month of September (Robinson 2017).

High levels of sediment transport can reduce habitat and water quality for salmonids, and are also of concern because high densities of M. speciosa (freshwater polychaete worms) have been observed in these habitats (Hillemeier et al. 2017, Som and Hetrick 2017). In addition, tributary rearing habitat currently accessed by Scott River coho salmon is compromised to some degree, most commonly by high instream sediment concentrations or impaired riparian communities (see NMFS 2014 for review).

2.4.1.3 Juvenile and Adult Migratory Habitat Conditions

A number of physical fish barriers exist in the Scott River watershed that can impede juvenile fish movement, redistribution, and migration. Big Mill Creek, a tributary to the East Fork Scott River, has a complete fish passage barrier caused by down cutting at a road culvert outfall. Additionally, historical mining has left miles of tailings piles along the mainstem and some tributaries of the Scott River. A seven mile reach of Scott River goes subsurface every summer due to this channel modification in combination with low flows, limiting juvenile redistribution. For example, during the summer of 2014 when flows were disconnected in the mainstem Scott River, large numbers of juvenile coho salmon were left stranded, unable to migrate to suitable rearing habitat. A large rescue-relocation effort led to 115,999 coho salmon being moved to cold water habitats; however, monitoring of this effort showed that relocation did not increase the survival of rescued fish (CDFW 2016). For many years, the City of Etna's municipal water diversion dam on Etna Creek effectively blocked fish passage into upper Etna Creek; however, this dam was retrofitted with a volitional fishway in 2010. In addition, valley-wide agricultural surface water withdrawals and diversions, and groundwater extraction have all combined to cause premature surface flow disconnection in the summer and delayed re-connection in the fall along the mainstem Scott River. These conditions can consistently result in restrictions or exclusions to suitable rearing habitat, contribute to elevated water temperatures, and contribute to conditions which cause juvenile fish stranding and mortality.

Upstream migration of adult coho salmon into the Scott River may begin in the last two weeks of October and may last into the first week of February. However, the majority of coho salmon migrate upstream during November and December with numbers decreasing in January (Magranet and Yokel 2017). The irrigation season ends on October 15 under the Scott River Decree; however, stock water is still diverted through the winter. In addition to the surface water diversions, there are a substantial number of larger alfalfa farms in the lower portions of the Scott Valley and along Moffett Creek that rely on groundwater pumping to meet their irrigation demands. These withdrawals lower the groundwater table below the elevation of the existing river channel, adversely affecting the abundance of interconnected groundwater to stream and river channels along the valley floor (Harter and Hines 2008, Hathaway 2012, S.S. Papadopulos & Associates 2012). As a result, surface flow connectivity in the fall is delayed until fall precipitation events and tributary flow contributions restore groundwater elevations up to a level equal to or greater than the elevations of the river channel. The delay in the establishment of adequate surfaces flows results in a corresponding delay in creating suitable flow conditions for adult salmon to migrate upstream through the lower Scott River canyon where several naturally occurring migration obstacles are present (NMFS 2014). This altered flow regime can result in substantial delay for migrating adult Chinook salmon and early migrations of coho salmon. In dry years, a lack in connectivity, particularly in the mine tailings reach of the mainstem Scott River, can prevent adults from migrating upstream and inhibit access between the Scott River and major tributary streams along the west side of Scott Valley (*i.e.*, Shackleford Creek, Kidder Creek, French Creek and Sugar Creek, etc.). For example, the mine tailings reach and adjacent tributary, Sugar Creek, were not connected until the last week of December during the winter of 2018. This delay in connection likely forced adult coho salmon to spawn in the less suitable habitat of the mainstem Scott River.

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

For our effects analysis, NMFS first analyzes the effects of the action on critical habitat (Section 2.5.1), and then NMFS analyzes the effects of the action on SONCC coho salmon individuals (Section 2.5.2).

2.5.1 Effects to SONCC Coho Salmon ESU Critical Habitat

The proposed action is expected to affect SONCC coho salmon critical habitat in the action area through Project implementation, but also through the continuing hydrologic and habitat modification effects associated with instream activities, particularly Project Stage 0 floodplain restoration (Powers et al. 2018) along lower Grouse and Big Carmen creeks.

The Project involves varying degrees of earth disturbance. Earth disturbance has the potential to increase suspended sediment mobilization to streams, during both Project implementation and later on after project completion. Earth disturbing activities, particularly those occurring in or immediately adjacent to stream channels (*e.g.*, Stage 0 restoration of the lower Grouse and Big Carmen creeks floodplain, Little Houston Creek channel restoration, Legacy site treatments) increase suspended sediment mobilization, causing temporary increases in turbidity and the deposition of excess sediment that may alter channel dynamics and stability (Habersack and Nachtnebel 1995, Hilderbrand et al. 1997, Hilderbrand et al. 1998). Heavy equipment operation in streams, riparian areas, and hydrologically connected uplands increases soil compaction, which can increase runoff during precipitation and snowmelt. Increased runoff can, in turn, increase the frequency and duration of high stream flows in disturbed areas. Higher stream flows increase stream energy, which has the potential to scour stream bottoms and transport greater sediment loads farther downstream than would otherwise occur.

Project activities involving ground disturbance in or adjacent to streams will generally be avoided by riparian reserve treatment buffers/setbacks of 300 feet on either side of fish-bearing streams, with buffers/setbacks of 150 feet on either side of non-fish-bearing streams. Due to equipment exclusion zones and the maintenance of effective riparian canopy shade in these riparian reserves, ground disturbance from Project thinning and fuels reduction activities is expected to be localized, small, and to be intercepted by intervening riparian reserve buffers. Project landings will not be constructed within riparian reserves if new, and will generally be outside of riparian reserves if extant. Any extant Project landings within riparian reserves are located further than 50 feet from a break in slope to a stream channel or inner gorge. Observing these various setbacks from streams will allow the intervening riparian reserves to intercept and arrest all but insignificant amounts of sediment mobilized by upland Project activities (Clinton 2011, Reeves et al. 2018).

Where the Project does cause ground disturbance in streams and on floodplains adjacent to them, turbidity and suspended sediment levels will increase, both at affected Project work sites and downstream from them. Stage 0 floodplain restoration of lower Grouse and Big Carmen creeks, instream habitat enhancement, large woody debris addition/tree tipping (*e.g.*, Little Houston Creek channel restoration), fish passage improvements, road/stream crossing improvements, riparian planting along stream banks, creation of off channel/side channel habitat, upland meadow restoration, and water drafting may all result in increased mobilization of sediment into streams. With the exception of Stage 0 floodplain restoration of lower Grouse and Big Carmen creeks, the magnitude and intensity of ground disturbance associated with the other listed Project activities is expected to be small, isolated, and confined so as to avoid or minimize sediment mobilization to the adjacent aquatic environment. Sediment mobilization from Project Stage 0 restoration is expected to be of moderate intensity, but short-lived and generally confined to lower Grouse Creek down to its confluence with the East Fork Scott River. Project-derived suspended sediment downstream from the Grouse Creek-East Fork Scott River confluence will be imperceptible, immediately dispersing and dissipating in East Fork Scott River flows (USFS 2019, Table 6; Foltz and Yanosek 2005, Foltz et al. 2008).

Exposure

Project-related sediment effects are expected during the Project implementation interval (June 15 through October 15, with the exception of prescribed burning), as well as during post-implementation peak flow winter storm events, when remaining Project-derived loose sediment will be mobilized. During Project implementation, the SONCC coho salmon juvenile life stage is most likely to be exposed to potential effects of increased sediment mobilization. As loose sediment is mobilized by elevated winter flows, adult SONCC coho salmon may also be exposed to increased turbidity. However, minimization measures, such as removing excess sediment from the restored floodplain surface prior to returning flow to it, will limit the amount of sediment released. Project design features will ensure that any increased mobilization of Project sediment will be small, confined to lower Grouse Creek, and become discountable when entering the East Fork Scott River downstream. The Project design itself will preclude future channel incision in the restored Grouse Creek floodplain, reducing flow energy and ending previous sedimentation of the Grouse Creek-East Fork Scott River confluence zone. Elevated winter flows will carry any mobilized fine sediment downstream to point bars and areas with slower water velocities. Some downstream salmonid redds may experience limited amounts of fine sediment accumulation, resulting in an immeasurably small reduction in water flow through such redds.

Summary of Effects to SONCC Coho Salmon ESU Critical Habitat

With the exception of floodplain and stream channel restoration activities, all other Project activities occurring in riparian reserves, including thinning and fuels reduction, will maintain effective stream shade via site-specific thinning prescriptions, no-treatment (*i.e.*, "no-cut") buffers, and equipment exclusion zones (USFS 2019, Appendix G; Reeves et al. 2018). These measures will avoid or minimize effects to stream margins and channels throughout the action area, resulting in immeasurably small effects on SONCC coho salmon critical habitat downstream. Moreover, cumulative watershed effects (CWEs) calculations confirm that no watersheds affected by the Project will cross, or even come close to, thresholds of concern for any of the three CWE disturbance and landslide indices (USFS 2019, Table 6).

The Project is likely to increase the quantity and quality of both spawning and rearing habitat throughout the restored floodplain of lower Grouse and Big Carmen creeks, while improving fish passage through the pre-Project depositional zone adjacent to the Grouse Creek-East Fork Scott River confluence. The Project is also expected to affect water depth and velocity along the restored lower Grouse Creek floodplain, spreading and slowing flow through a complex braided network of channels, facilitating fish passage. Multiple juvenile SONCC coho salmon migration corridors within the restored Grouse Creek floodplain are expected to sustain suitable depth and velocity for routine flows, including summer base flows. NMFS expects that approximately 35 acres of previously unavailable floodplain habitat will again become available to all freshwater life stages of SONCC coho salmon, and salmonids generally.

The proposed action will positively affect water quality in lower Grouse Creek and where it joins with the East Fork Scott River. In the spring, elevated Grouse Creek flows will be buffered by the water and fine sediment detention properties of the restored Grouse Creek floodplain. Hyporheic exchange through floodplain sediment is expected to increase and extend the cool water plume of Grouse Creek flow further into the warmer summer flows of the East Fork Scott River. The latter were recorded to have MWATs of 22.9 °C in 2013 (Robinson 2013). Anywhere that this cool water plume keeps water temperature at or below 19.0 °C in the action area during late spring/summer, it will locally forestall the onset of conditions stressful for juvenile coho salmon. Moreover, water temperature is a primary influence on the ability of water to hold oxygen, thus the Project's increase and downstream extension of Grouse Creek's cool water has the potential to also increase dissolved oxygen levels downstream.

2.5.2 Effects to SONCC Coho Salmon Individuals

SONCC coho salmon in the action area occupy the East Fork Scott River (Magranet and Yokel 2017). Though spawning surveys in Grouse Creek in winter 2002, 2004-2007, 2012, and 2014 failed to locate either coho salmon redds or carcasses (USFS 2019), coho salmon are able to access the lower reaches of the larger tributaries to the East Fork Scott River (*i.e.*, Grouse Creek, Taylor Creek, Big Mill Creek, Kangaroo Creek, Rail Creek, and Houston Creek). Individual coho salmon present in these tributaries are expected to be affected during Project implementation, but also by the continuing hydrologic and habitat modification effects associated with process-based Stage 0 floodplain restoration (Powers et al. 2018) along lower Grouse and Big Carmen creeks.

Short-term increases in turbidity are anticipated to occur on three occasions: during the redirection of stream flow from the extant/active channels of Grouse and Big Carmen creeks onto their newly restored floodplain surfaces (*i.e.*, instantaneous dewatering/rewatering); during rewatering of the restored/infilled channels of Grouse and Big Carmen creeks; and during the first elevated flows associated with increased fall precipitation after Project completion. The first turbidity event will occur after completion of Project floodplain reconstruction/regrading, which will be undertaken while leaving stream flow undisturbed in the two extant channels of Grouse and Big Carmen creeks. During the low flow Project implementation period, these two stream channels will effectively bypass stream flow away from high and dry floodplain surfaces while they are reconstructed/regraded. During this Project regrading work, floodplain substrate will be piled into berms, as needed, along the active channels of Grouse and Big Carmen creeks, for two purposes: 1) to ensure that surface flows introduced onto the newly regraded floodplains do not re-enter these two channels; and 2) to provide sufficient substrate to regrade/infill these two former stream channels, as per Project design requirements. When all floodplain regrading work has been completed, stream flow will be diverted out of Grouse and Big Carmen creeks onto restored floodplain surfaces, initiating short-term sediment mobilization and turbidity at and downstream from the work site. When regrading/infilling of the Grouse and Big Carmen creek channels has been completed, any unused remnants of the berms along them will be smoothed out, allowing floodplain surface flows to disperse across the entire Project Stage 0 area – initiating a second, more localized, short-term Project-caused turbidity event. Placement of silt fencing and/or weed-free hay bales will help intercept mobilized sediment during these two turbidity events (Foltz et al. 2008, see Term and Condition 2 below). The third turbidity event will occur after Project completion, when the first elevated fall precipitation flows mobilize any loose sediment remaining on restored floodplain surfaces.

Salmonid research has shown that high turbidity concentrations can reduce fish feeding efficiency, decrease food availability, reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can cause fish mortality (Berg and Northcote 1985, Gregory and Northcote 1993, Velagic 1995, Waters 1995). Mortality of coho salmon fry can result from increased turbidity (Sigler et al. 1984). Even small pulses of turbid water will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Nevertheless, much of the research mentioned above focused on turbidity levels significantly higher than those likely to result from proposed Project activities, especially with implementation of Project design features, and avoidance and minimization measures.

Research investigating the effects of sediment concentration on fish density has routinely focused on high sediment levels. For example, Alexander and Hansen (1986) measured a 50 percent reduction in brook trout (*Salvelinus fontinalis*) density in a Michigan stream after manually increasing the sand sediment load by a factor of four. In a similar study, Bjornn et al. (1977) observed that salmonid density in an Idaho stream declined faster than available pool volume after the addition of 34.5 m3 of fine sediment into a 165 m study section. Both studies attributed reduced fish densities to a loss of rearing habitat caused by increased sediment deposition. However, streams subject to infrequent episodes adding small volumes of sediment to the channel may not experience dramatic morphological changes (Rogers 2000). Similarly, research investigating severe physiological stress or death resulting from suspended sediment exposure has also focused on concentrations much higher than those typically found in streams subjected to minor to moderate sediment input (Newcombe and MacDonald 1991, Bozek and Young 1994).

The concentrations of sediment and turbidity expected from Project activities, including Stage 0 floodplain restoration work, are unlikely to be elevated enough to cause severe injury or death of juvenile coho salmon. Anticipated low levels of turbidity and suspended sediment resulting from Stage 0 restoration work, the greatest Project instream/in-channel disturbance, will likely result in only temporary behavioral effects to any coho salmon present. Monitoring of newly replaced culverts in Humboldt County detailed a range in turbidity changes downstream of newly replaced culverts following winter storm events (Humboldt County 2002). During the first winter following construction, turbidity rates, measured in nephelometric turbidity units (NTUs) downstream of newly replaced culverts exceeded 100 NTU in only one instance, whereas the majority (81 percent) of downstream readings were less than 20 NTU. Turbidity levels necessary to impair feeding are likely in the 100 to 150 NTU range (Gregory and Northcote 1993, Harvey and White 2008). All NTU measurements increased an average of 19 percent when compared to measurements directly above each culvert monitored. However, the range of increases within the 11 monitored culverts was large (range of 123 percent to -21 percent) (Humboldt County 2002, 2003, 2004). Monitoring results from one- and two-year-old culverts showed much lower increases in NTUs downstream from the culverts (n=11; range of 12 percent to -9 percent), with an average increase in downstream turbidity of one percent. These culvert monitoring results indicate decreasing turbidity as projects age from year one to year three, with most measurements remaining within concentrations likely to cause only slight behavioral changes in fish [e.g., increased gill flaring (Berg and Northcote 1985), elevated cough frequency (Servizi and Martens 1992), and avoidance behavior (Sigler et al. 1984)]. The Project's design features, some of which were not observed in the Humboldt County culvert work analyzed above, will likely ensure that downstream sediment effects from Project instream work will be no more, and presumably less, than those described.

Risk

Small pulses of moderately turbid water expected from the proposed Project instream activities, including Stage 0 floodplain restoration, have the potential to cause minor bio-physical and behavioral effects, such as dispersing salmonids from established territories, potentially increasing interspecific and intraspecific competition, as well as increasing predation risk for the small number of affected fish.

NMFS does not expect sediment effects to accumulate far downstream from Project activity sites in any affected watershed, including lower Grouse Creek. Sediment effects generated by individual Project activities will likely impact only the immediate footprint of each activity site, and no further downstream than to the confluence of Grouse Creek and the East Fork Scott River, approximately 3000 feet (914 meters, Google Earth Pro 2019) down Grouse Creek from the Grouse and Big Carmen floodplain restoration site. Studies of sediment effects from culvert construction determined that the level of sediment accumulation within streambeds returned to control levels between 358 to 1,442 meters downstream of the culvert (Lachance et al. 2008, Foltz et al. 2008). Because of the multiple Project design features to minimize sediment mobilization (KNF 2019, Appendix G), downstream sediment effects from the Project, including Grouse and Big Carmen creeks Stage 0 floodplain restoration, are expected to extend downstream for a distance consistent with the range presented by Lachance et al. (2008). Finally, effects to fish are expected to be short-term, since most Project-related sediment will likely mobilize during the initial high-flow events of the first winter season after Stage 0 floodplain restoration. Some sediment mobilization may continue to occur during the second and third winter seasons after Project completion, but is expected to subside to baseline conditions by the third year (Humboldt County 2004, Klein 2006).

Noise, Motion, and Vibration Disturbance from Heavy/Mechanized Equipment Operation

Noise, motion, and vibration produced by heavy equipment operation are expected at Project instream/floodplain sites. The use of heavy equipment will occur primarily outside active stream channels, with infrequent, short-term equipment entry in wetted channels to: redirect incised channel flow onto newly restored floodplain surfaces; upgrade four road/stream crossings; place large wood in stream channels; and place hose intakes and fish exclusion screens at three water drafting locations. These activities are expected to result in short-term and localized adverse effects to any salmon present, including SONCC coho salmon, and has the potential to result in lethal take. SONCC coho salmon will, however, be able to reduce or avoid effects from such instream activities, by volitionally relocating to suitable habitat either upstream or downstream from Project instream work, including Stage 0 floodplain restoration and Project water drafting.

Beneficial effects to SONCC Coho Salmon

All Project activities, including Stage 0 floodplain restoration, are designed and will be implemented consistent with Project design features (USFS 2019, Appendix G), to maximize potential benefits while also minimizing adverse effects to salmonids. Stage 0 floodplain restoration is designed to: restore degraded salmonid habitat by improving pool habitat, channel complexity, spawning gravels, and flow levels; remove flow and sediment barriers to fish passage (*e.g.*, the depositional zone adjacent to the Grouse Creek-East Fork Scott River confluence); and reduce or eliminate erosion and sedimentation impacts associated with ongoing channel incision. Although the Project may cause take of SONCC coho salmon juveniles during and for a short time after construction, the Project will restore and enhance habitat previously unavailable to SONCC coho salmon, both immediately and over the long-term.

a. Instream Habitat Improvements

In addition to the habitat benefits discussed earlier in the Effects to SONCC Coho Salmon ESU Critical Habitat Section (Section 2.5.1), stream enhancement techniques, designed to reduce juvenile displacement downstream during winter floods and to provide cool water refugia during summer low flows, are expected to substantially increase rearing success and survival of SONCC coho salmon. Presence and abundance of LWD, to be increased along 3.9 miles of streams and within the Grouse and Big Carmen Stage 0 restoration area, is correlated with increased growth, abundance, and survival of juvenile salmonids (Fausch and Northcote 1992, Spalding et al. 1995).

b. Instream Barrier Modification for Fish Passage Improvement

Fish passage improvements (*e.g.*, dissipation of the depositional zone adjacent to the Grouse Creek-East Fork Scott River confluence, and removal of passage barriers at road/stream crossings (*e.g.*, the 40N03 road/stream crossing ford over Grouse Creek), will increase SONCC coho salmon adult and juvenile access to previously unavailable habitat, especially along 1.1 miles of Grouse and Big Carmen creeks. The Project will likely increase the current spatial structure of the Scott River SONCC coho salmon population. Reappearance of SONCC coho salmon in previously unavailable upstream habitat will also likely increase reproductive success and ultimately fish population size in the Scott River watershed, where the amount of quality freshwater rearing habitat is a limiting factor (NOAA Fisheries 2014).

c. Fish Exclusion Screens

Use of fish exclusion screens during Project water drafting will reduce the risk of fish being impinged or entrained into pumps and drafting hardware. Proper use of NOAA-compliant fish screens (NOAA Fisheries 2001b) will ensure that SONCC coho salmon injury or stranding is avoided, and that coho salmon are able to migrate past Project water drafting sites along streams.

2.5.3 Summary of Effects to Individuals

All freshwater life stages of SONCC coho salmon have the potential to be exposed to Project effects during and, for a short time, after Project implementation. The Scott River population of SONCC coho salmon, and specifically coho salmon present in the East Fork Scott River and its larger tributaries, will experience the most pronounced exposure. Coho salmon present downstream from the distant East Fork Scott River-South Fork Scott River confluence are not likely to be exposed. Adult coho salmon are present in the Scott River Basin only during their upstream migration and spawning period (October through January). Coho salmon eggs and fry associated with the small number of annual East Fork Scott River spawners, as well as coho salmon fry that rear in and then emigrate from the East Fork Scott River Basin, are expected to be present in the Project action area each winter and spring. Though some juvenile coho salmon may rear in locations away from where they emerge, many are expected to hold and rear in the East Fork Scott River Basin throughout their first year (0+), eventually outmigrating to the Pacific Ocean during March-May of their second year (1+).

NMFS has concluded that Project implementation is not likely to adversely affect stream flows and/or water temperature in the Project area, including in Grouse and Big Carmen creeks. Water temperatures in streams directed affected by Project implementation are expected to be within the suitable range for rearing juvenile coho salmon, rarely exceeding 19.0 °C during the Project (Robinson 2013), and are not expected to impede any coho salmon movement or migration away from Project activities. NMFS expects that the Project will improve coho salmon movement/passage in the action area, while also increasing the quantity and quality of coho salmon spawning, egg incubation, and rearing habitat, both immediately and in the long term after the Project.

Thermal refugia along the East Fork Scott River are locations where cooling tributary flows provide coho salmon juveniles refuge when surrounding water temperatures become elevated. The Project will not adversely affect the amount or timing of cooling tributary flows into the East Fork Scott River in late spring/summer, and is expected to enhance and prolong cool water plumes emanating from restored Project floodplain and riparian habitat.

Floodplain and riparian restoration activities will increase stream cover and shading for rearing juveniles, moderate stream temperatures, and improve water quality through pollutant filtering. Such restoration activities will occur along the lower reaches of tributaries to the East Fork Scott River, where rearing juvenile salmonids will immediately benefit from increased and enhanced riparian cover and shade.

Apart from large woody debris addition, floodplain restoration along Grouse and Big Carmen creeks, fish passage improvement, and water drafting, all other Project activities will occur on surfaces outside of wetted channels and away from flowing water. Since the majority of such Project work will occur during the late spring/summer period (note: underburning will occur throughout the year) when stream flows are low, and Project Design Features designed to avoid and/or minimize potential adverse environmental effects will be followed, Project-related erosion into adjacent water bodies will be localized, dispersed, and minor.

Summary

NMFS concludes that SONCC coho salmon individuals are likely to experience adverse effects from the proposed action. Of all such adverse effects, NMFS believes that there is a minor risk of take of any juvenile coho salmon present when instream work occurs during Project implementation (*i.e.*, disrupting normal behavior, crushing, or killing). However, based on spawning surveys between 2002 and 2014 that failed to locate either coho salmon redds or carcasses (USFS 2019) where Project instream work is to occur, the number of coho salmon likely to be affected is small. In contrast, NMFS believes that soon after Project implementation coho salmon abundance and productivity will begin to improve, due to the increased and enhanced floodplain and riparian habitat resulting from the Project. NMFS concludes the proposed action is not likely to result in a level of critical habitat reduction that reduces coho salmon fry and juveniles in the actions area in the long term, or reduces life history diversity. Finally, NMFS does not expect that the proposed action will reduce the spatial structure of coho salmon populations in the action area but, to the contrary, will increase it.

Factoring in the status of the Scott River coho salmon population and the SONCC coho salmon ESU, the environmental baseline conditions of the action area, and the cumulative effects, NMFS concludes the proposed action is not likely to increase the extinction risk of the Scott River population. Therefore, the proposed action is not likely to increase the extinction risk of the Interior Klamath River Diversity Stratum or the SONCC coho salmon ESU as a whole. As a result, NMFS concludes the proposed action would not be expected to appreciably reduce the likelihood of both the survival and recovery of the SONCC coho salmon ESU.

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). 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 add to the effects of climate change within the action area (Section 2.2.2.3). However, it is difficult if not impossible to distinguish between future environmental conditions in the action area that result from global climate change, and that are properly part of the environmental baseline, versus cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4). Although NMFS lacks definitive information about the extent or location of future State, Tribal, local, or private activities, the effects of these future non-Federal actions on SONCC coho salmon and their critical habitat have been characterized in the Final Recovery Plan for SONCC coho salmon ESU (NMFS 2014), are likely to be similar in the future.

2.7 Integration and Synthesis

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

a. Numbers

NMFS estimates the effects of Project implementation will be greatest during and immediately after Stage 0 floodplain restoration, when the likelihood of adverse effects to any individual coho salmon present will be the greatest. As restored floodplain surfaces stabilize, the potential for take will decrease and then continue to recede during the approximately ten years of overall Project implementation. During these ten years, all other Project treatments are expected to be implemented, including instream activities like Legacy site treatments and addition of woody debris. Effects from ground disturbance associated with these treatments will be less than what occurs during Stage 0 floodplain restoration work, and are expected to be small, localized, and fleeting. This ten-year period will sustain the effects of cyclical weather patterns, but will also provide enough time for storm-generated sediment pulses to cycle through affected streams via scour and transport mechanisms. During this ten-year interval, all three brood year cycles of SONCC coho salmon may be impacted during their egg/alevin life stage. But based on the anticipated effects of the action, NMFS concludes only a small portion the Scott River population, in the East Fork Scott River watershed, will be exposed to Project effects that occur in the action area. This exposure will decrease during this ten year interval while, at the same time, enhanced spawning and rearing habitat will lead to increases in coho salmon numbers in the Project action area.

As discussed in Section 2.4, the Scott River coho salmon population has a moderate risk of extinction (NMFS 2014). The abundance estimates for the population fall below the levels needed to achieve a low risk of extinction. The majority of streams and rivers in the ESU have impaired habitat. Additionally, critical habitat in the ESU often lacks the ability to establish essential features due to ongoing and past human activities. Water use throughout the ESU, including the Project action area, reduces summer base flows, which limits the establishment of several essential features such as water quality and water quantity.

NMFS expects many of the activities discussed in the Environmental Baseline (Section 2.4) will continue (e.g., harvest, predation, restoration activities, and land use/management activities). In addition, future climate change effects on coho salmon in the Klamath Basin within the period of the effects of the proposed action, may have noticeable additional effects on coho salmon beyond what has been occurring. Some specific climate changes anticipated to affect coho salmon include changes in seasonality of runoff, decreased snow water equivalent, decreased snowpack, and warmer air and water temperatures.

The Project will result in adverse effects to individuals in East Fork Scott River and its larger tributaries such as Grouse Creek, where NMFS expects floodplain restoration work will cause a small decrease in the rate of SONCC coho salmon egg to fry and juvenile survival affecting at least one brood year cycle of coho salmon. However, NMFS expects that there will be only a minor, immeasurably small reduction in numbers of individuals at the ESU scale. In addition, the number of juveniles killed is expected to decrease beginning in the second year after Project implementation, as Project floodplain restoration and large wood loading treatments stabilize, sort, depose, and dissipate Project-generated sediment, while simultaneously improving and increasing habitat for all freshwater life history stages of SONCC coho salmon.

As mentioned in the Status of Critical Habitat section (Section 2.2.2.2) above, habitat generally remains degraded across the ESU but restorative actions are effectively improving the conservation value of critical habitat throughout the range of the SONCC coho salmon, including portions of the Interior Klamath Diversity Stratum. Recent projects have included techniques to create important slow water and off channel habitat that is limited across the range of the ESU, while also increasing water detention and storage. Studies have shown positive effects of these restorative techniques to coho growth and survival (Cooperman et al. 2006, Ebersole et al. 2006, Witmore 2014, Yokel et al. 2018).

b. Reproduction

As discussed above, for approximately one year, NMFS estimates the Proposed Action will result in a small, reduced rate of egg to fry and juvenile SONCC coho salmon survival due to increased delivery of fine sediment from instream and upstream Project activities. In years when November-early December flows increase sufficiently to connect the stream network, it is likely that adult coho will return to the East Fork Scott River to spawn (Magranet and Yokel 2017). Any adult coho salmon spawning in the East Fork Scott River are expected to have their reproductive success only slightly reduced, due to the attenuation and dilution of Project-generated fine sediment entering the East Fork Scott River. These adverse effects are expected to start decreasing in the second year after Project implementation, as Project-generated sediment is stabilized on floodplain surfaces or moves out of the system and adult coho salmon access to restored habitat in Grouse and Big Carmen creeks improves. Given the small reduction in reproduction success expected in the East Fork Scott River, due primarily to Project floodplain restoration and Legacy site treatment activities, NMFS expects that there will be only minor effects to reproduction at the ESU scale.

c. Distribution

Project effects are not anticipated to adversely affect access to habitats or create barriers to migration. Rather, NMFS expects that the distribution and spatial structure of the Scott River population of SONCC coho salmon will be extended/enhanced as a result of Project activities that increase the amount of floodplain habitat accessible to coho salmon while minimizing sediment delivery to streams (Section 2.5.2). Moreover, NMFS expects that the Project will have an immediate beneficial effect by increasing SONCC coho salmon rearing opportunities and distribution along the 1.1 linear miles of Stage 0 restoration of the Grouse and Big Carmen creek channels, thereby increasing the likelihood of survival and recovery of SONCC coho salmon.

d. Conservation Value of Critical Habitat

The proposed action will occur in a setting where fish habitat has already experienced marked and observable changes from historical mining, road building, and logging. Ongoing climate change, along with an intensifying summer storm regime (Section 2.4.2.2), are expected to add to historical impacts in the action area, We discussed in the Effects of the Action (Section 2.5), how the proposed action will modify conditions downslope and downstream by altering the runoff and erosion from disturbed soils that are hydrologically connected with the stream network. As a result, there will be effects to designated critical habitat in seven 7th field watersheds associated with the East Fork Scott River 7^{th} field (Section 1.3), due to sediment erosion and delivery of fines to those streams. The amount of fine sediment estimated to enter each of the critical habitat streams is small. The change in coho salmon egg to fry and juvenile survival is expected to be small and temporary, with such effects confined primarily to the restored floodplain areas of Grouse and Big Carmen creeks. These effects will become positive soon after restored floodplain areas are re-watered. Thus, the magnitude of Project adverse effects to critical habitat will be small at both the Scott River population and ESU scale.

Critical habitat in the Scott River SONCC coho salmon population area will be adversely affected for up to ten years until all fuels reduction and Legacy site treatment have been completed. However, these adverse effects will diminish and beneficial effects will increase with the passage of time. Given the KNF's prior experience with repairing and upgrading road/stream crossings, adding large wood to streams, improving drainage to prevent landslides, outsloping roads to disperse water, and applying standard engineering requirements for constructing and maintaining unpaved roads and crossings, NMFS believes that soil disturbance from Project activities will be managed to minimize the risk of sediment mobilization events that are larger or more numerous than would occur naturally. While adverse impacts to SONCC coho salmon designated critical habitat will occur especially during the first year after Project floodplain restoration, NMFS believes that the proposed action is not likely to reduce the value of the critical habitat for the conservation and recovery of SONCC coho salmon. To the contrary, Project habitat restoration activities align with habitat restoration activities included in the NOAA Restoration Center's Northern California Restoration Programmatic (NMFS 2012), and will serve to enhance critical habitat while improving SONCC coho salmon access to it, both immediately and in the long time.

Summary

While factoring in environmental baseline conditions of the action area, the status of the Scott River SONCC coho salmon population, the status of the SONCC coho salmon ESU, and cumulative effects (Section 2.6), NMFS believes the proposed action is not likely to increase the extinction risk of the population or reduce the conservation value of designated critical habitat. Therefore, the proposed action is not likely to increase the extinction risk to the Interior Klamath Diversity Stratum or the SONCC coho salmon ESU, or result in adverse modification of designated critical habitat.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SONCC 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). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows: NMFS anticipates the proposed action will result in incidental take in the form of harm to SONCC coho salmon ESU individuals through short-term loss of rearing habitat availability, and increased sediment mobilization and turbidity. In addition, NMFS anticipates the proposed action will result in incidental take in the form of harassing, wounding, capturing, and killing SONCC coho salmon ESU individuals through, in descending order: channel dewatering/ rewatering during Stage 0 floodplain restoration activities; upgrading four road/stream crossings; placing large wood in stream channels, or when placing/removing hose intakes and fish exclusion screens for water drafting. These activities are expected to result, in descending order, in short-term and localized adverse effects to any salmon present, including SONCC coho salmon, and have the potential to result in lethal take. SONCC coho salmon will, however, be able to reduce or avoid effects from such instream activities, by volitionally relocating to suitable habitat either upstream or downstream from such Project instream work.

With the exception of Stage 0 floodplain restoration of lower Grouse and Big Carmen creeks, the magnitude and intensity of ground disturbance associated with other Project instream activities is expected to be small, transient, and confined so as to avoid or minimize sediment mobilization to the adjacent aquatic environment. Sediment mobilization from Project Stage 0 restoration is expected to be of moderate intensity, but short-lived and generally confined to lower Grouse Creek down to its confluence with the East Fork Scott River. Project-derived suspended sediment downstream from the Grouse Creek-East Fork Scott River confluence will be imperceptible, immediately dispersing and dissipating in East Fork Scott River flows.

Quantifying the amount or extent of incidental take of coho salmon from Project implementation is difficult since the number of SONCC coho salmon present and potentially affected by Project implementation is unknown. However, NMFS identified that the proposed action will result in the incidental take of juvenile coho salmon in designated critical habitat in the East Fork Scott River and the lower reaches of its larger tributaries (*i.e.*, Taylor Creek, Big Mill Creek, Grouse Creek, Kangaroo Creek, Rail Creek, and Houston Creek). This incidental take will be the harm caused by short-term loss of rearing habitat availability, increased sediment mobilization and turbidity, and harassment and death of an unknown number of juvenile SONCC coho salmon ESU individuals. The loss of rearing habitat, sediment mobilization, and harassment and death of individuals will, in turn, result from the following activities in SONCC coho salmon critical habitat: channel dewatering/rewatering during restoration of approximately 1.1 linear miles (86 acres) of floodplain habitat; upgrading four road/stream crossings; placing large wood along 3.9 linear miles of stream channels; and when placing/removing hose intakes and fish exclusion screens for water drafting at three locations. By limiting incidental take to these locations, where effects from Project activities overlap with SONCC coho salmon critical habitat, NMFS feels that a small number (<20) individual coho salmon are likely to be injured. This estimate is based on the number of coho salmon subject to take if present during dewatering of approximately 5,800 feet of stream channel, averaging 10 feet in width. Assuming a density of 0.1 individuals per 10 ft2 (530 individuals, Brown and Moyle 1991) in the degraded stream habitat subject to restoration, and injury/death of approximately three percent of these individuals during exclusion/dewatering. This results in estimated take of 16 individual coho salmon. Only a few coho salmon are expected to be injured or killed during implementation of all other Project instream activities, as most of the few coho salmon present will be able to temporarily relocate to suitable rearing habitat either upstream or downstream. The KNF will be required to report to NMFS any changes to the Project that increase this area of overlap between Project effects and SONCC coho salmon critical habitat.

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 (RPMs)

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

NMFS believes that the RPMs and terms and conditions described below are necessary and appropriate to minimize the likelihood of incidental take of listed species due to completion of the proposed action.

The KNF shall comply with the following RPMs:

1. Minimize hydrologic effects of the action on SONCC coho salmon.
2. Minimize soil erosion and sediment transport into watersheds, especially those used by SONCC coho salmon.
3. Prepare and provide NMFS with a monitoring plan and reporting program each year until all Project activities have been implemented, including Stage 0 floodplain restoration, to: better understand Project effects on critical habitat; monitor incidental take impacts from the Project; and minimize the likelihood of incidental take of coho salmon in the future.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the KNF must comply with them in order to implement the RPMs (50 CFR 402.14). The KNF has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the KNF 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: *minimize hydrologic effects of the action on SONCC coho salmon*.

   a. Design the drainage features associated with floodplain restoration surfaces, road/stream crossing upgrades/reconstruction, temporary roads, heavy equipment maintenance areas, landings, and spoils disposal sites in a manner that disperses runoff from these surfaces as much as possible, or which routes such runoff into existing channels that can accommodate the additional discharge while minimizing sediment delivery to downslope streams.

   b. Prior to floodplain restoration and temporary road construction, submit to NMFS a topographic map of the planned road alignments and locations of drainage features (dewatering/rewatering channels, water bars, dips, rock aprons, etc.), and then ensure that the plans are implemented as intended, by undertaking fish exclusion at dewatering/rewatering channels, and placing markers on the ground at the exact locations where drainage features will be constructed.

   c. Maintain stockpiles of fresh crushed rock and certified weed free rice straw at secure and strategic locations near the Project, for immediate use in rocking road and restored surfaces sufficiently to preclude conditions that exceed Wet Weather Operations Standards (USFS 2002).

d. Inspect all restored floodplains, temporary roads, and landings in riparian reserves, while they are on the landscape, to identify rills or gullies after each rainfall event that are large enough to generate surface runoff from road surfaces, and then ensure completion of necessary improvement or repair of ditches, cross drains, and outsloped surfaces to prevent further development of rills or gullies (Watershed-18, Watershed-O).

2. The following terms and conditions implement reasonable and prudent measure 2: *minimize soil erosion and sediment transport into watersheds, especially those used by SONCC coho salmon.*

a. Immediately after completing Project heavy equipment operations, inspect restoration sites, roads, and skid trails leading to and within Project activity areas, to ensure that applicable soil cover guidelines (USFS 1994, Table 4-2) are met and, if not, provide soil cover (i.e. hay, mulch, slash, etc.) where needed to meet these soil cover standards.

b. Except in emergency situations, do not allow heavy vehicles, including logging trucks, to use the 40N03 road/stream ford crossing over Grouse Creek during the Project.

c. Do not allow Project skid trails to overwinter without completing erosion minimization measures described in 2.a.

d. Ensure that mulch/slash and water bars that meet soil cover standards remain within cable-yarding corridors and on skid trails in tractor yarded units at Project completion (Watershed-23 and USFS 1994, Table 4-2).

e. Avoid using temporary roads for more than one operational season, but if over wintering any temporary road is unavoidable, winterize such road according to relevant PDF (Watershed-18).

f. Provide critical/rolling dips with rocked aprons along Project roads wherever stream capture or diversion potential exists.

g. Make concerted efforts to implement Project Legacy site treatments, identified during Clean Water Act consultation with the North Coast Regional Water Quality Control Board, as soon as possible, to improve fish passage and to help offset effects from Project implementation.

3. The following terms and conditions implement reasonable and prudent measure 3: *Prepare and provide NMFS with a monitoring plan and reporting program each year until all Project activities have been implemented, including Stage 0 floodplain*

restoration, to: better understand Project effects on critical habitat, including beneficial impacts like increases in and enhancement of (re)activated floodplain habitat; monitor incidental take impacts from the Project; and minimize the likelihood of incidental take of coho salmon in the future.

a. The KNF will continue to institute "storm patrols" during wet weather periods, to identify drainage malfunctions, sediment mobilization, and/or slope failures that occur on restored floodplain surfaces, Project activity units, or downslope from temporary roads and landings. The KNF will then provide detailed information, as soon as possible, about the location and amount/extent of sediment mobilized in the action area, and the resulting effects on riparian and aquatic habitat downslope/downstream. The KNF will propose measures to mitigate or rehabilitate Project-related adverse erosion events. The KNF will provide NMFS any streambed fine sediment monitoring data for lower Grouse Creek as soon as practicable after it is obtained.

b. The KNF will maintain a log of any actions taken to mitigate or rehabilitate Project-related erosion, for at least one year after completion of all Project activities.

c. The KNF will maintain a log of each post-rainfall inspection of restoration sites, temporary roads, and landings, and record any remedial actions taken to prevent further development of rills or gullies, for at least one year after completion of all such Project activities.

d. KNF will provide an annual summary report to NMFS of the above monitoring activities by December 31, beginning in the first year that project implementation begins. Reports shall be sent to: Don Flickinger, NMFS, Yreka Office, 1711 South Main Street, Yreka, California 96097.

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).

The following recommendations are discretionary measures that NMFS believes are consistent with this direction and, therefore, should be carried out by the KNF:

1. To create suitable spawning substrate from processed tailing pile material, screen rather than crush such tailings, to provide large gravel/small cobble having a non-angular structure suitable for use as salmonid spawning habitat;

2. To mitigate the effects of climate change on ESA-listed SONCC coho salmon, follow recommendations by the Independent Scientific Advisory Board (ISAB 2007) to plan now for future climate conditions, by implementing protective habitat restoration

measures that benefit coho salmon in the East Fork Scott River and its tributary watersheds. In particular, implement projects to: remove barriers to aquatic species passage, especially at the 40N03 road/stream ford crossing over Grouse Creek; protect or restore riparian buffers, meadows, wetlands, and floodplains; identify and undertake wood loading projects in SONCC coho salmon critical habitat using available hazard trees and other large wood resources; and enhance late summer and fall tributary stream flows; and

3. Notify NMFS when and where the KNF carries out these recommendations so that NMFS can track and update environmental baseline conditions in all affected watersheds.

2.11 Reinitiation of Consultation

This concludes formal consultation for the East Fork Scott Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

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. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

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

3.1 Essential Fish Habitat Affected by the Project

The proposed action affects EFH for Chinook and coho salmon in the East Fork Scott River and its larger tributaries (*i.e.*, Taylor Creek, Big Mill Creek, Grouse Creek, Kangaroo Creek, Rail Creek, and Houston Creek), as well as the mainstem Scott River downstream from Callahan, California, to Messner Gulch. In this area, Habitat Areas of Particular Concern (HAPC) that would be adversely affected include: complex channel and floodplain habitat, spawning habitat, thermal refugia, and submerged aquatic vegetation (see descriptions of salmon HAPCs in the Pacific Coast Salmon Fishery Management Plan (PFMC 2014, Appendix A)).

3.2 Adverse Effects on Essential Fish Habitat

As described in the effects analysis above, the proposed action adds to the historical effects of mining, logging, and road building in the action area, by altering the hydrology, surface runoff, and erosion associated with earth-disturbing activities, particularly those occurring in or immediately adjacent to stream channels (*e.g.*, Stage 0 restoration of the lower Grouse and Big Carmen creeks floodplain, and Little Houston Creek channel restoration). Although the Project is expected to result in adverse effects to EFH through sediment delivery, those effects are expected to be minor and unlikely to cause measurable effects on EFH downslope/downstream. Ground disturbance in or adjacent to streams will generally be avoided by treatment buffers/setbacks of at least 150 feet from fish-bearing streams with mid- and late- seral vegetation cover, and at least 50 feet from fish-bearing streams with early seral vegetation cover.

The largest risk of adverse effects to EFH from the action stems from Stage 0 restoration of the lower Grouse and Big Carmen creeks floodplain. Surface runoff from restored/recontoured floodplain surfaces could potentially mobilize sediment, causing turbidity plumes downstream. This risk will be low due to reduced stream flow energy across the restored floodplain, and will continue to abate as floodplain surfaces stabilize, become vegetated, and are covered with complex debris.

Overall, the possibility of the Project causing sediment mobilization will be minimized by following Project minimization measures, PDFs, BMPs, and WWOS (USFS 2002), resulting in negligible effects to salmonid EFH, both on site and downstream.

3.3 Essential Fish Habitat Conservation Recommendations

Due to Project design considerations that avoid or minimize potential impacts from near-stream and instream activities, and the comprehensive nature of Project minimization measures, PDFs, BMPs, and WWOS (USFS 2002), NMFS has no EFH conservation recommendations to provide.

3.4 Supplemental Consultation

The KNF 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 effects the basis for NMFS' EFH Conservation Recommendations (50 CFR600.920(1)).

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the KNF. Other interested users could include the U.S. Fish and Wildlife Service as well as local Tribes, watershed councils, and resource conservation districts. Individual copies of this opinion were provided to the KNF. This opinion will be posted on the Environmental Consultation Organizer (ECO) at eco.fisheries.noaa.gov. The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion [*and EFH consultation, if applicable*] 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, if applicable*], and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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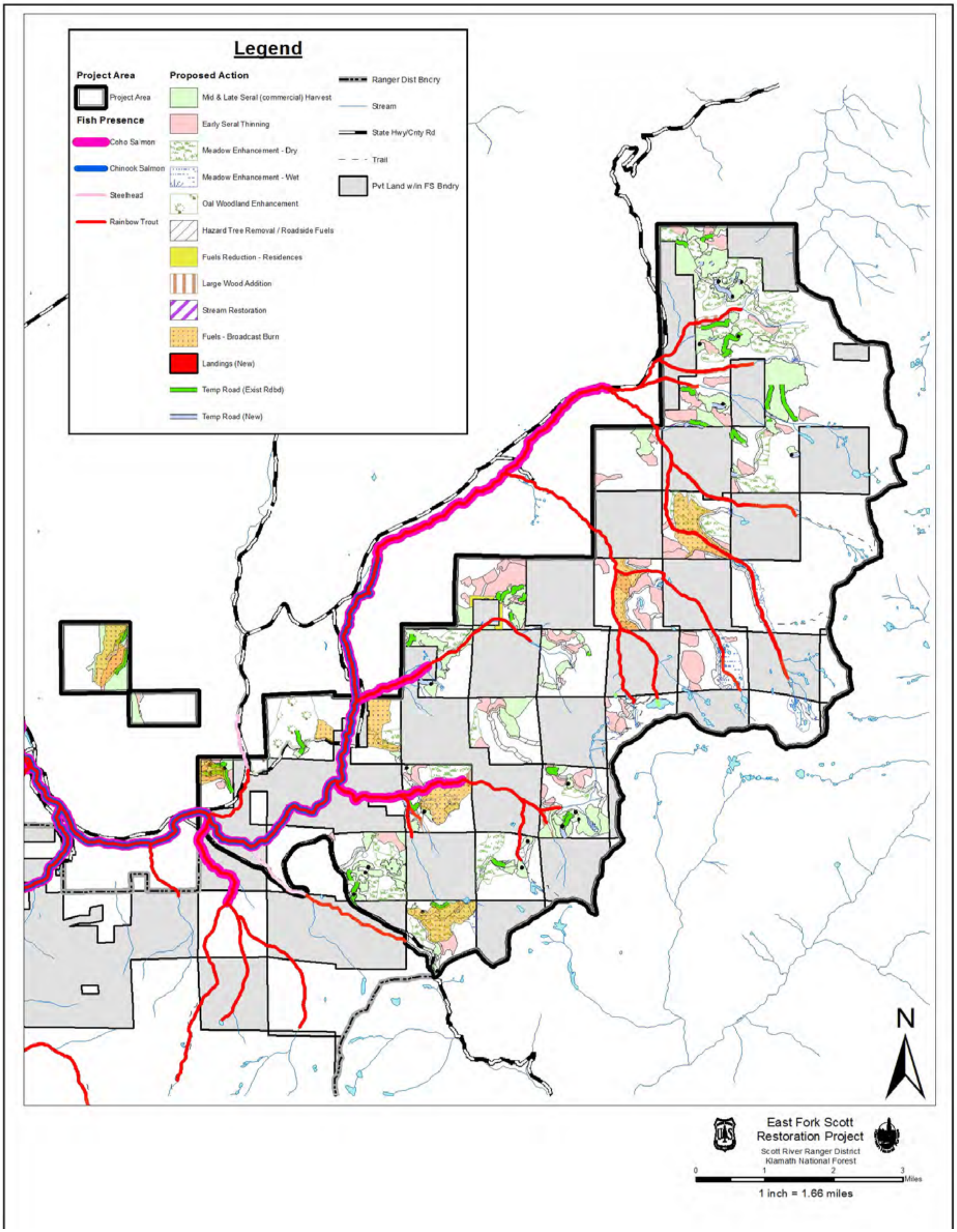
Personal Communication

Donald Flickinger – NOAA Fisheries West Coast Region (Yreka, CA)

6 APPENDIX A



Legend
Project Area
Project Area
Fish Presence
Coho Salmon
Chinook Salmon
Steelhead
Rainbow Trout
Proposed Action
Mid & Late Seral (commercial) Harvest
Early Seral Thinning
Meadow Enhancement - Dry
Meadow Enhancement - Wet
Oak Woodland Enhancement
Hazard Tree Removal / Roadside Fuels
Fuels Reduction - Residences
Large Wood Addition
Stream Restoration
Fuels - Broadcast Burn
Landings (New)
Temp Road (Exist Rdbd)
Temp Road (New)
Ranger Dist Bndry
Stream
State Hwy/Cnty Rd
Trail
Pvt Land w/in FS Bndry
N
East Fork Scott
Restoration Project
Scott River Ranger District
Klamath National Forest
0
1
2
3
Miles
1 inch = 1.66 miles

Figure A.1