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NATIONAL MARINE FISHERIES SERVICE
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Refer to NMFS No.: WCRO-2022-01540

December 30, 2022

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Lt. Col. ShaiLin KingSlack
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Re: Endangered Species Act Section 7 Reinitiation of Formal Consultation and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Clear Creek Integrated Restoration, Clear Creek, HUCs 170603040101, 170603040102, 170603040103, Idaho County, Idaho (One Project)

Dear Ms. Probert and Lt. Col. KingSlack:

Thank you for your letter of June 13, 2022, requesting initiation of consultation with NOAA’s National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Clear Creek Integrated Restoration Project.

NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) [16 U.S.C. 1855(b)], and concluded that the action would adversely affect the EFH of Pacific Coast Salmon. Therefore, we have included the results of that review in Section 3 of this document.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 (“2019 Regulations,” see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court’s July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government’s request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we



considered whether the substantive analysis and conclusions articulated in the biological opinion (opinion) and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

In this opinion, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River Basin (SRB) steelhead. NMFS also determined the action will not destroy or adversely modify designated critical habitat for SRB steelhead. Rationale for our conclusions is provided in the attached opinion.

As required by section 7 of the ESA, NMFS provides an incidental take statement (ITS) with the opinion. The ITS describes reasonable and prudent measures (RPM) NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth terms and conditions, including reporting requirements, which the Nez Perce-Clearwater National Forests (NPCNF) and U.S. Army Corps of Engineers (COE) must comply with in order to be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's effects on EFH pursuant to section 305(b) of the MSA, and includes six Conservation Recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These Conservation Recommendations are similar, but not identical to the ESA terms and conditions. Section 305(b)(4)(B) of the MSA requires federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH Conservation Recommendations, the NPCNF and COE must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many Conservation Recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, in your statutory reply to the EFH portion of this consultation, NMFS asks that you clearly identify the number of Conservation Recommendations accepted.

This document replaces the previous biological opinion, NMFS No. WCRO-2019-00545, for this project.

You may contact Aurele LaMontagne at NMFS' Boise office at 208-378-5686 or at aurele.lamontagne@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,



Nancy L. Munn
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Enclosure

cc: K. Urbanek – COE
T. Peak – COE
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**Endangered Species Act Section 7(a)(2) Biological Opinion and
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat
Consultation**

Clear Creek Integrated Restoration
Clear Creek, HUCs 170603040101, 170603040102, 170603040103
Idaho County, Idaho

NMFS Consultation Number: WCRO-2022-01540

Action Agencies: Nez Perce-Clearwater National Forests and U.S. Army Corps of Engineers

Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Snake River steelhead (<i>Oncorhynchus mykiss</i>)	Threatened	Yes	No	No

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

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

Issued by:



Nancy L. Munn
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Date: December 30, 2022

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ACRONYMS

ACRONYMS	DEFINITION
μPa	micropascal
BA	Biological Assessment
BMP	Best Management Practices
CCIR	Clear Creek Integrated Restoration Project
cfs	Cubic Feet per Second
CE	Cobble Embeddedness
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act
dB	Decibel
DPS	Distinct Population Segment
DQA	Data Quality Act
ECA	Equivalent Clearcut Area
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
Forest Plan	Nez Perce National Forests Plan
ft ²	Square Feet
HUC	Hydrologic Unit Code
ICTRT	Interior Columbia Basin Technical Recovery Team
IDL	Idaho Department of Lands
IFPA	Idaho Forest Practices Act
ISAB	Independent Scientific Advisory Board
ITS	Incidental Take Statement
LCC	Lower Clear Creek
LWD	Large Woody Debris
MMBF	Million Board Feet
mg/L	Milligrams per liter
MgCl ₂	Magnesium Chloride
mi/mi ²	Mile per Square Miles
mm	Millimeters
MPG	Major Population Group
MSA	Magnuson Stevens Fishery Conservation and Management Act
NFS	National Forest System
NMFS	National Marine Fisheries Service
NPCNF	Nez Perce-Clearwater National Forests
NTU	Nephelometric Turbidity Unit
Opinion	Biological Opinion
PBF	Physical or Biological Features

ACRONYMS	DEFINITION
PCE	Primary Constituent Elements
PED	Potential ecological damage
RHCA	Riparian Habitat Conservation Area
RMO	Riparian Management Objectives
ROS	Rain-on-snow
RPM	Reasonable and Prudent Measures
Skidding	Ground Based Yarding
SRB	Snake River Basin
tons/acre	Tons per acre
tons/mi ²	Tons per square mile
TSZ	Transient Snow Zone
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VSP	Viable Salmonid Population
WEPP	Water Erosion Prediction Project

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

National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and (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 MSA (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository [<https://repository.library.noaa.gov/welcome>]. A complete record of this consultation is on file at the NMFS SRB Office in Boise, Idaho.

1.2 Consultation History

This opinion is based on information provided in the Nez Perce-Clearwater National Forests' (NPCNF) consultation package including the April 15, 2019, biological assessment (BA), Clear Creek Integrated Restoration Project (CCIR) Addendum dated May 17, 2022, various e-mail and telephone conversations, and information exchanged in North Idaho Level 1 Team meetings. The main exchanges in the interagency communications for this consultation, including consultation on a previous version of this project, are summarized below.

May 15, 2012: The NPCNF presented the initial proposal for the CCIR at a Level 1 meeting.

November 24, 2015: NMFS issued a biological opinion for the CCIR project (NMFS No.: WCR-2014-1844).

August 19, 2016: The NPCNF withdrew the Record of Decision for the CCIR and requested that NOAA withdraw its biological opinion and incidental take statement for the CCIR.

September 1, 2016: NMFS withdrew the November 24, 2015, biological opinion, incidental statement, and MSA consultation.

July 3, 2018: NMFS received a draft BA for a renewed action for the CCIR. On September 4, 2018, NMFS returned the draft BA with comments.

March 12, 2019: NMFS received a second draft BA including an updated proposed action (Alternative C modified) and analysis including a summary of the baseline road analysis completed

by the Forest Service Rocky Mountain Research Station in Moscow, Idaho, entitled *Results of Erosion Analysis of the Clear Creek Road Network: Nez Perce-Clearwater National Forests* (Elliot et al. 2018).

April 15, 2019: NMFS sent final comments on the second draft BA.

April 17, 2019: NMFS received a final BA, BA errata, and request for formal consultation dated April 15, 2019.

July, 17, 2019: NMFS sent the draft proposed action, terms and conditions, and conservation measures to the Nez Perce Tribe for comment.

On July 30, 2019, NMFS received comments and suggestions from the Nez Perce Tribe.

On August 26, 2019, the NPCNF received a Biological Opinion from NMFS (NMFS No. WCRO-2019-00545).

On September 10, 2021, NMFS received a letter from the Nez Perce Tribe requesting reinitiation of consultation and a government-to-government meeting to discuss the reinitiation request. A government-to-government meeting was held with the Nez Perce Tribe on October 26, 2021.

Subsequently, the Nez Perce Tribe and the Forest developed Alternative D Modified and identified it as the final proposed action for the CCIR.

The Forests also were in discussions with the Nez Perce Tribe; and the Forests developed Alternative D Modified and identified it as the final proposed action for the CCIR.

On February 25, 2022, NMFS reinitiated consultation on the CCIR project via email. The need for reinitiation was based on information in the Nez Perce Tribe's letter requesting NMFS reinitiate the consultation and based on the Forests' changes to the proposed action, expressed under the Alternative D modified selection. On March 2, the NPCNF sent a brief summary of changes to the 2019 proposed action that would be the basis for reinitiation.

From March 2, 2022 to May 25, 2022 NMFS exchanged updated proposed action and analysis information with the NPCNF.

On May 25, 2022, NMFS and the NPCNF reached closure at the May 25, 2022 Level 1 monthly meeting. It was agreed that a new final BA was not necessary, but the information exchanged from March 2, 2022 to May 25, 2022 would be included as part of the consultation package. When compared to the 2019 proposed action, the 2022 proposed action includes substantially less harvest; however, because the reduced harvest and similar amount of burning retain a similar distribution across Forest lands in Clear Creek, the haul road network has not changed except with fewer temporary roads which will no longer be needed because associated harvest units have been dropped from the proposed action. When comparing to 2019, there has been no expansion in proposed road work or burning, and individual harvest units have not expanded or increased in prescription intensity.

On June 13, 2022, NMFS received a request for formal ESA, and EFH consultations, a copy of the BA dated April 15, and addendum dated May 17, 2022. Information exchanged through emails from March through June on changes to the proposed action were also incorporated into the consultation package. ESA and EFH consultations were initiated on this date.

From June 22, 2022, through June 29, 2022, NMFS and the NPCNF continued to exchange minor clarifications and refinements in information to better capture the effects of the project to SRB steelhead, their critical habitat, and Pacific Salmon EFH in this opinion.

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

1.3 Proposed Federal Action

Under the ESA, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. Under the MSA, “Federal action” means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910).

The NPCNF is the lead action agency for implementing the proposed action on Federal lands administered by the U.S. Forest Service (USFS). The U.S. Army Corps of Engineers (COE) is the action agency, authorized by the Department of the Army (DA), for permitting the discharge of fill material into waters of the U.S. associated with instream work necessary to prepare roads for haul.

The NPCNF proposes the CCIR to reduce existing and potential forest fuels, create conditions that will contribute to sustaining long-lived, fire-tolerant tree species, contribute to the economic and social well-being of the local community, and improve the aquatic habitat in the upper Clear Creek watershed (Figure 1). Project activities will include timber harvest, prescribed fire treatments, and road construction, reconstruction, reconditioning, and decommissioning. Other related activities include regular road maintenance (including road gravel surfacing) and dust abatement, and weed treatments. Timber harvest is proposed for seven timber sales awarded over a 5-year period from 2023 to 2027. Typical timber sale contracts last 4 years with road and timber haul occurring during the latter 3 years of the contract. Therefore, the harvest and road actions associated with the last sale contract in 2027, could take until 2030 to complete. Typically, road work starts the year after the contract is awarded, and finished before cutting and hauling of trees begins. All post-harvest

reforestation and site rehabilitation work will conclude in 2032. Because of the specific conditions necessary for landscape burning, landscape burning can take up to 20 years to complete, ending by the end of 2043 (Figure 2). Assuming burning will start before the final sale, the project is likely to take 20 years to complete (2043).

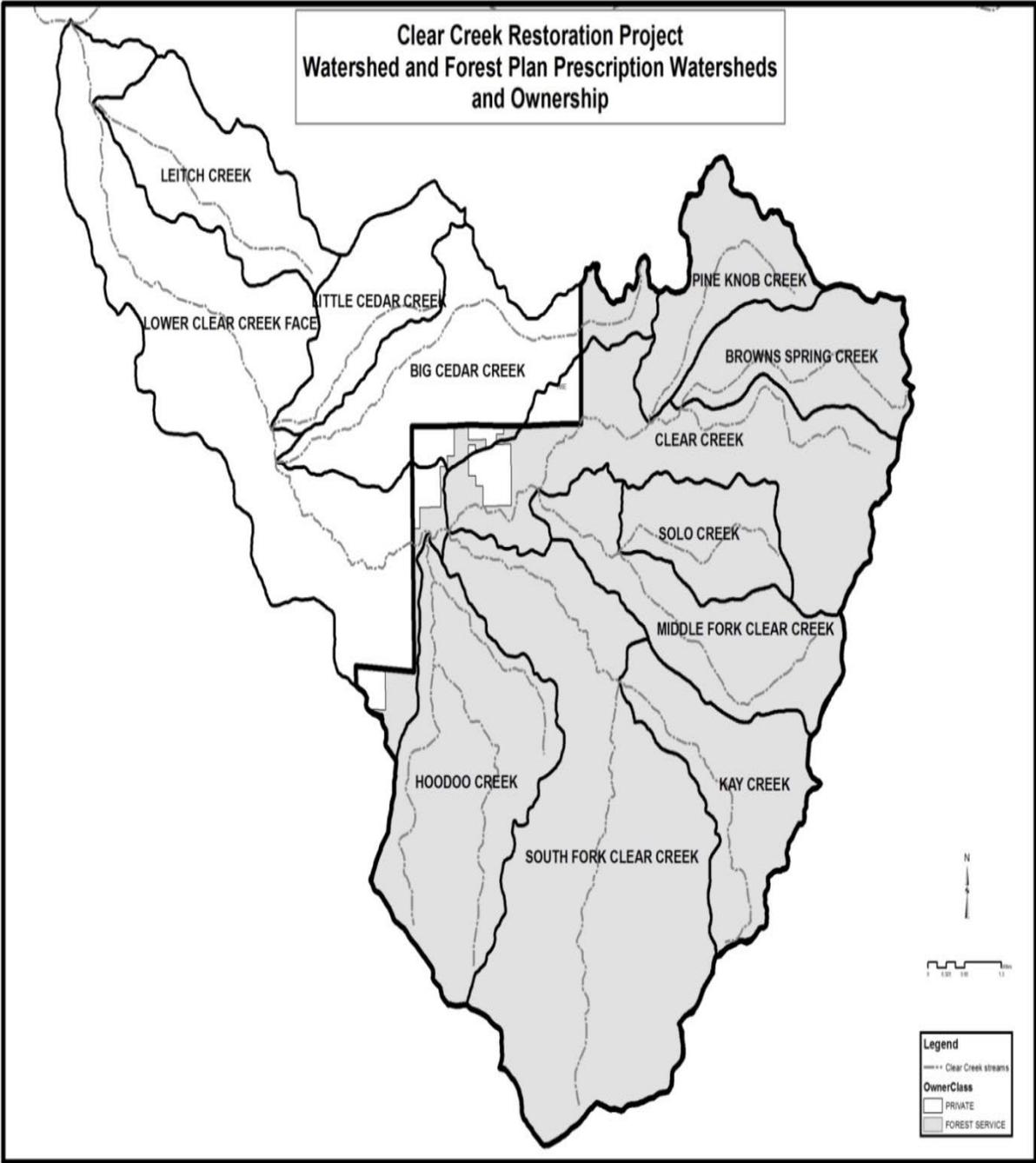


Figure 1. Clear Creek Hydraulic Unit Code (HUC) 5 watershed and NPCNF Plan prescription watershed boundaries and ownership.

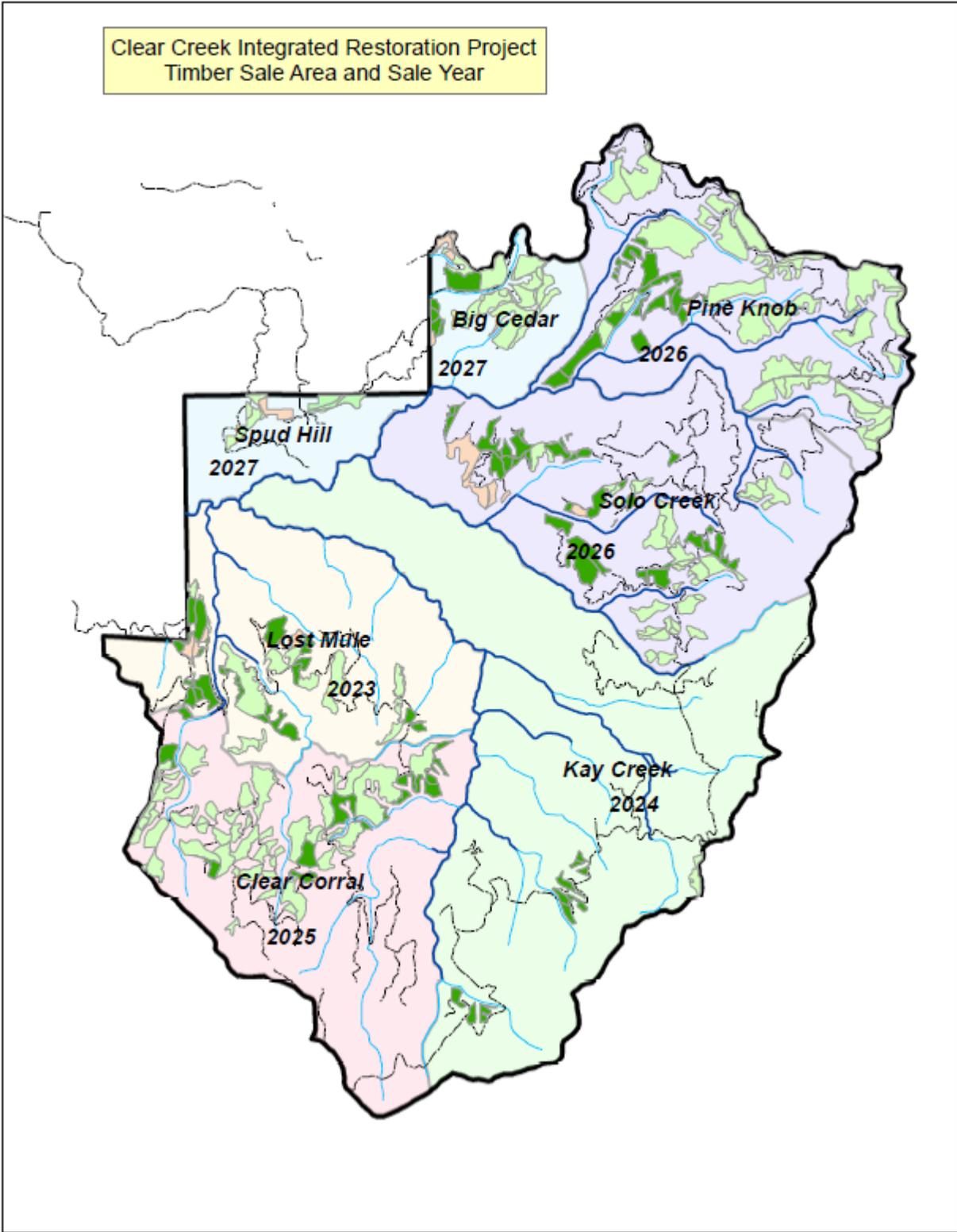


Figure 2. Proposed Clear Creek Project timber sale boundaries by sale year.

The Nez Perce-Clearwater National Forests Plan (Forest Plan; National Forest System Land Management Planning Rule 36 CFR Part 219) allows timber management activities to occur in sediment-limited watersheds, concurrent with improvement efforts to reduce sediment, as long as a positive upward trend in habitat carrying capacity is indicated (Gerhardt et al. 1991). The NPCNF also included, as part of this action and described in the following sections, a series of best management practices (BMPs)/minimization measures, as well as road decommissioning and reconstruction activities to support an upward trend in fish habitat and water quality. In addition, the NPCNFs’ proposed Monitoring Plan, as described below, is intended to help ascertain if the proposed restoration activities, in combination with the BMPs described below as part of the proposed action, will lead to the objective of achieving upward trend.

1.3.1 Proposed Timber Harvest Activities

The NPCNF is proposing 5,854 acres of timber harvest (estimated 48 million board feet [MMBF]) in 10 Clear Creek prescription watersheds over an 8-year period (Figures 2 and Table 1). Timber sale contracts typically last 4 years with work beginning the year after contracting and with 3 years of road work, harvest and haul occurring during the latter 3 years of the contract. Because the contracts will be awarded from 2023 through 2027, work on the ground is expected to occur over an 8-year period from 2024 through 2030. Table 1 includes information on all harvest and non-harvest methods and quantities.

Table 1. Summary of timber harvest treatments (described below) and yarding methods (acres).

Watershed Information		Proposed Treatment (acres)				Yarding Method	
Subwatershed	Forest Service Land	Precomm. Thin - No harvest	Regen	Comm. Thin	Improvement	Ground-based	Skyline
Clear Creek	6,583	393	143	476	5	290	334
Hoodoo Creek	6,446	422	361	1,174	31	973	593
South Fork Clear Creek	12,941	319	263	313	0	336	239
Kay Creek	3,537	261	0	25	0	16	9
Middle Fork Clear Creek	4,025	97	99	235	99	300	133
Pine Knob Creek	2,622	90	75	598	0	562	110
Brown Springs Creek	3,057	55	205	724	0	576	352
Solo Creek	2,226	136	282	187	32	281	221
Big Cedar Creek	720	0	75	329	50	288	167
Lower Clear Creek Face	568	11	37	20	16	64	10
Total	42,725	1,784	1,540	4,081	233	3,686	2,168

Watershed Information		Proposed Treatment (acres)				Yarding Method	
Subwatershed	Forest Service Land	Precomm. Thin - No harvest	Regen	Comm. Thin	Improvement	Ground-based	Skyline
Total Harvest		No Harvest	5,854			5,854	

1.3.1.1 Harvest

Regeneration harvest removes the majority (up to 85 percent) of trees from a harvest unit while leaving other trees for wildlife habitat and future soil productivity. Variable retention prescriptions for the leave trees are used depending on the habitat type with moister sites retaining more trees and drier sites generally retaining less (as would occur under a natural fire regime). Clumps of trees and individual trees are left throughout the unit at a rate of 14 to 28 trees per acre. Downed woody material is also left within the unit for soil productivity at a rate of 7 to 33 tons per acre (tons/acre). There are 1,540 acres of regeneration proposed (Table 1).

Commercial thinning (including intermediate harvest) generally removes up to 60 percent of a stand while leaving the healthiest, more insect and disease or fire-resistant trees in the stand. Tree spacing is generally 20 to 30 feet between tree crowns, and is dependent on the habitat type. There are 4,081 acres of commercial thinning proposed (Table 1).

Improvement harvest involves the removal of ladder fuels from around existing large ponderosa pine and other legacy trees left as a result of the last fire disturbance in the area. Remnant legacy trees are being encroached upon by less fire-resistant trees creating ladder fuels. In the event of a fire, the ladder fuels could cause the mortality of the legacy trees. The intent of this treatment is to retain the legacy trees on the landscape and improve their chances for survival in the event of a fire. There are 233 acres of improvement proposed (Table 1).

Pre-commercial thinning is the removal of trees not for immediate financial return, but to reduce stocking and promote growth of the more desirable trees for eventual commercial harvest. These trees are cut and left on site and not hauled away as indicated in Table 1. There are 1,784 acres of pre-commercial thinning proposed (Table 1).

Yarding is the movement of felled trees or logs from the area where they are felled to the landing by ground based vehicles (skidding) or by a skyline yarding. In ground-based logging or skidding, the trees or logs will be dragged across the ground by a cable (3,686 acres). In skyline yarding, logs are suspended from a cable when brought to a landing (2,168 acres). To reduce ground disturbance, no skidding will be allowed on slopes over 35 percent, unless mitigating measures, such as operating on adequate compacted snow or only skidding over short distances, are approved by the soil specialist.

Landslide prone areas were identified (250 acres) and field verified in harvest units. As a BMP, landslide prone areas will be further identified during unit layout, excluded from harvest, and given a 100-foot PACFISH no harvest buffer.

The design features or BMPs listed below are proposed to restrict activity in Riparian Habitat Conservation Areas (RHCAs), and minimize soil disturbance and erosion, and minimize sediment delivery to streams.

- No timber harvest will occur within PACFISH streamside RHCAs (i.e., within 300 feet of fish-bearing streams, 150 feet of perennial non-fish bearing water and wetlands larger than one acre, 100 feet of intermittent streams, landslide prone areas, and wetlands one acre or smaller).
- No ground-based skidding will be allowed on slopes over 35 percent, unless mitigating measures, such as operating on adequate compacted snow or only over short distances, are approved by the soil specialist.
- Activities will be restricted when soils are wet to prevent soil damage (indicators include excessive rutting, soil displacement, and erosion).
- Skid trails, landings, and yarding corridors will be located and designated to minimize the area of increased detrimental soil effects.
- Existing skid trails and landings will be used to the extent possible and all will be decommissioned after use. Decommissioning includes de-compaction of the trail and the placement of large woody material on the surface.
- Equipment used for machine piling or mastication of activity slash will remain on designated skid trail or will be required to rehabilitate (decompact or recontour) any detrimental disturbance they cause.
- De-compaction will span the width of the compacted areas and extend to a depth of 10–18 inches, to effectively loosen the ground to allow water penetration and revegetation and to prevent the rocky sub-surface soils from mixing with the topsoil. The depth of de-compaction will be adjusted to avoid turning up large rocks, roots, or stumps. Equipment will not be permitted to operate outside the clearing limits of the skid trail.
- De-compaction will be done from June 15 to October 15, unless otherwise approved. No de-compaction work will be done during wet weather or when the ground is frozen or otherwise unsuitable.
- All erosion control barriers and cross ditches removed or otherwise rendered ineffective by the de-compaction treatment will be reinstalled as they were prior to the de-compaction.
- Non-channelized sediment delivery from harvest units to streams will be prevented using BMPs found in Rules Pertaining to the Idaho Forest Practices Act Title 38, Chapter 13, Idaho Code, and Soil and Water Conservation Practices Handbook, FSH 2509.22.

- When machine piling, existing duff/litter will be retained as much as possible and not included in the activity slash piling.
- Coarse woody material will be retained within harvest units for nutrient cycling, and maintaining soil moisture, soil stability, and other soil physical and biological properties. Drier habitat types have wood retention requirements of 7–15 tons/acre for Douglas fir, grand fir, and ponderosa pine types. Moister habitat types require 17–33 tons/acre.
- For units with high subsurface erosion potential, the amount of excavated skid trails and landings will be limited to the extent possible, decommissioned (full recontour), and receive an application of large woody material for soil stabilization.
- In regeneration harvest areas, approximately 14–28 standing trees per acre will be retained for future down wood recruitment. Snags or other designated retention trees felled for safety reasons will be left in the unit.

1.3.1.2 Prescribed Fire

Fuel treatment includes broadcast burning (used in open canopy grass and shrub lands), jackpot burning (a type of broadcast burning to reduce high fuel areas and promote a mosaic burn pattern following harvest), and machine and hand fuels piling. Machine piling only occurs on ground-based harvest units and broadcast burning usually occurs on skyline yarded units. Jackpot burning can occur on either harvest type. The total acres for each treatment type are based on slash concentrations after harvest activities are complete but will be similar to the total acres of regeneration or improvement harvest. No burning will occur within commercial thin units. Burning of harvest activity generated slash will be designed in the project burn plan to provide a low-severity mosaic burn with little-to-no detrimental disturbance of soil resources. Slash will be allowed to overwinter prior to burning.

For legacy trees, burning objectives will strive for variable tree survival with almost all legacy trees surviving prescribed fire. Fuel reduction measures would be implemented where needed to insure survival of the legacy larch, ponderosa pine, and Douglas-fir.

For non-legacy trees, expected survival is 50 percent. For areas requiring 100 percent live canopy retention, the burn objective will be to prevent fire entry into these areas. Low-intensity fire may be allowed to back into the edges of some of these sensitive areas and would result in no less than 90 percent live-canopy retention for the area.

Natural fuels prescribed burning (broadcast burning) is proposed on approximately 1,373 acres within the Clear Creek Roadless Area. The proposed activities would reduce the level and continuity of hazardous fuels in the project area and adjacent to private property. This would trend the project area landscape toward a more fire resilient condition, and reduce the risk of loss of life, property, and resources from large wildfires within the project area.

The treatments are designed to remove surface fuels and the majority of the ladder fuels, thus raising the height from the ground to the tree canopy, which would inhibit surface flames from

readily moving into the tree crowns. Broadcast burning would be used, and no timber harvest or ground-based machinery is involved.

The design features or BMPs listed below are proposed to restrict activity in RHCAs, and minimize the risk of unintentional high severity burns.

- No ignition will occur in PACFISH buffers but prescribed fire will be allowed to back burn into these areas.
- Burning will be done under moderate conditions that minimize the risk of a high severity burn including: air temperature less than 85 degrees, wind speed less than 10 miles per hour, and a relative humidity range between 17 percent and 57 percent.
- Burn units will be divided into smaller units than those appearing on the map and ignition will occur on ridge tops first and continue in the downhill direction in order to prevent heat buildup and reduce fire severity.
- Prescribed fire would not be ignited in areas requiring 100 percent live canopy retention.

Water drafting (pumping) in the action area streams may be necessary for providing water for prescribed burning. The procedures and BMPs for water pumping from streams is described below in the Water Pumping Section.

1.3.1.3 Weed Treatment

Areas most susceptible to weed introduction include roadways, landings, and skid trails. To minimize the spread of noxious weeds and invasive plants, all equipment will be cleaned of loose debris prior to entering the action area. The use of herbicides is not proposed. Following activities, project-related exposed soils (i.e., landings, skid trails, road sides, etc.) will be re-vegetated using certified noxious weed free native seed mix and fertilizer (as necessary) upon project completion.

1.3.1.4 Haul

There will be an estimated 48 MMBF of logs hauled from the action area over a period of 5 to 8 years. Because timber contracts will be awarded over a 5-year period and typically takes 4 years to complete a contract (contract awarded in the first year, then harvest and haul the following 3 years), the total time for harvest and haul for all sales is likely to occur over an 8-year period until 2030. Roads proposed for haul that are currently open or closed will continue their open or closed status following haul. Many roads will service a single timber sale while the primary routes, routes with haul over one MMBF, will service more than one location or sale. Table 2 outlines the number of miles, round trips, and expected years of use for primary haul routes; Figure 3 shows these primary routes in the action area. For the three main haul routes leaving the National Forest System (NFS) boundary, the Kooskia Road 286 is estimated to be used to haul 30 MMBF or 62 percent of the haul, the haul on Clearwater Road 650 is estimated at 9 MMBF or 19 percent, and the haul on Lighting Creek Road 1106 is estimated at 9 MMBF or 19 percent of the haul. Log haul would occur

during dry or frozen conditions with most occurring between the months of June and September. About 16 miles of all haul roads on Forest managed lands occur within RHCAs and cross streams.

Table 2. Primary haul routes and estimated haul metrics.

Haul Road # (HUC 12s)	Haul Road Miles	MMBF Hauled	Maximum Estimated No. of Trips ¹	Loads Per Day June-Sept ²	Assumed Time Period of Use (# Years) ³
Kooskia-Road 286 Route Total	40.4	29.7	6700	-	-
286 Upper Clear Creek Lower Clear Creek	20.7	15.4	3080	10	4
1114 Upper Clear Creek	5.4	6.6	1320	15	1
9730 Upper Clear Creek	6.5	5.7	1700	10	2
1855 South Fork Clear Creek	7.8	2	600	10	1
Clearwater-Road 650 Route Total	7.8	9	1800	-	-
650-North Lower Clear Creek Rabbit Cr- SF Clearwater R	7.8	9	1800	15	2
Lightening Creek-Road 1106 Route Total	18.7	8.9	1780	-	-
650-South Lower Clear Creek	2.3	3.9	780	15	1
1106 –Clear-Cr Lower Clear Creek	5.9	4	800	10	1
1160 Lower Clear Creek	1.4	1	200	10	1
1106 –South-Fork Rabbit Cr- SF Clearwater R Lightning Cr- SF Clearwater R	9.1	*see note below	*see note below	10-15	3
Total for all primary haul routes	67	47.6	10280	-	10

1. Trips based on an average volume per load of 5 thousand board feet (MBF).

2. Based on five trucks per day.

3. Based on 20 haul days per month during the four-month season of use.

* These are overlapping routes that are already included in the totals.

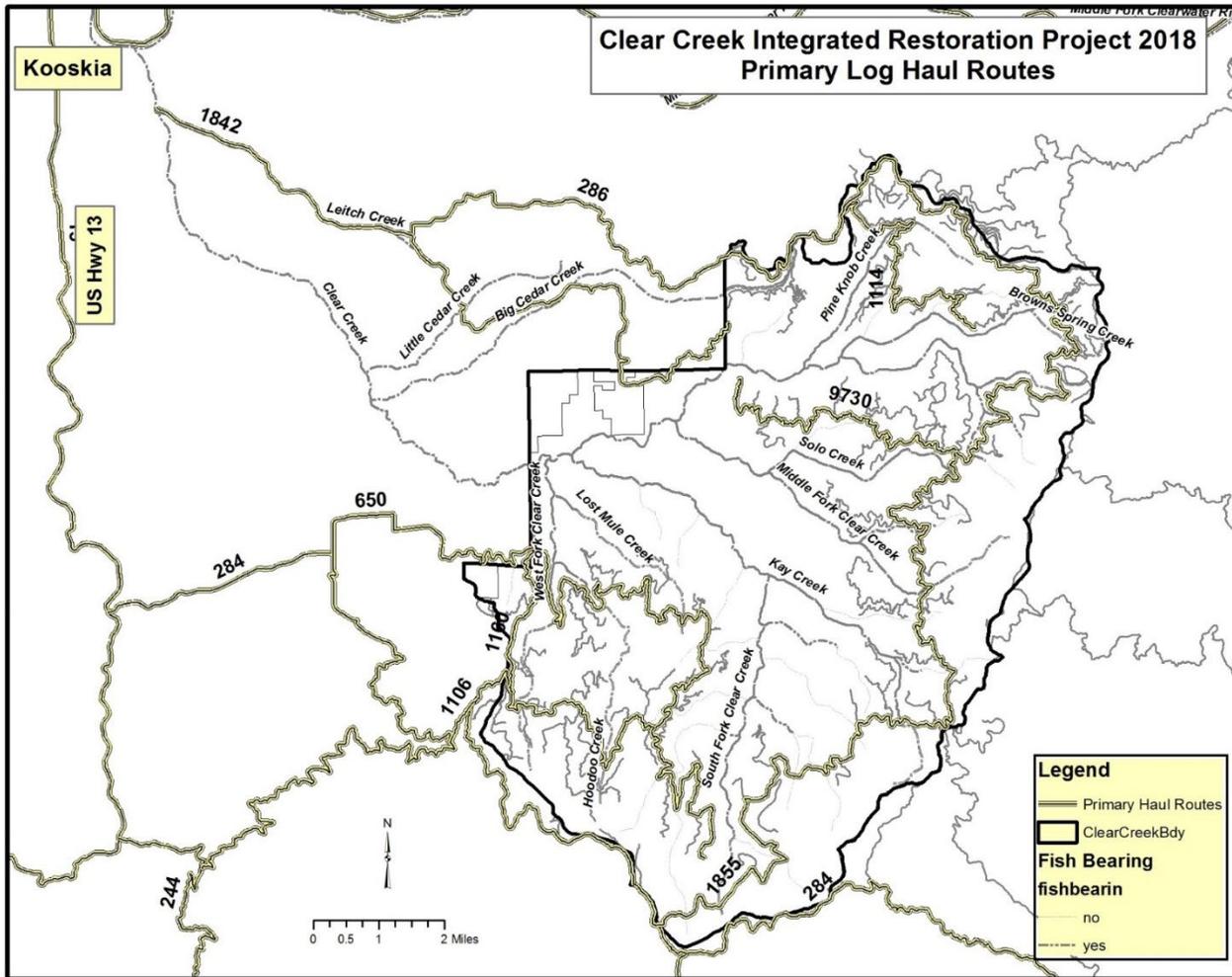


Figure 3. Map of primary haul routes. The Forest Service land boundary is outlined in black.

Haul routes exiting NFS lands are generally paved with a few exceptions. The paved roads include the Roads 1842, 286, 284, and US Highways 12 and 13 (Figure 3) and Road 515 (Clear Creek Road; not pictured in Figure 3). Portions of gravel haul roads that leave the NFS boundary include 4.3 miles of Road 1842 with one crossing over Big Cedar Creek and another over a small tributary to Big Cedar Creek, 4.4 miles of Road 650 with three crossings, and 9.9 miles of Road 1106 with seven stream crossings. Gravel Road 1106 is adjacent to Green Creek for the lower 1.4 miles; this section of Green Creek is steelhead critical habitat and drains in the South Fork of the Clearwater River.

Dust abatement will be applied to haul routes in any year it is used for hauling. Dust abatement is applied to maintain visibility for drivers and minimize sediment delivery to streams. Typically, magnesium chloride ($MgCl_2$) is used for dust abatement on graveled haul routes where harvest volumes exceed one MMBF (Roads 286, 650, 1106, 1114, 1160, 1855, and 9730). When applied to the road surface, a 1-foot no-spray buffer is left on the edges of the road, if road width allows, to minimize overspray into ditches which could contaminate streams. Because the application of $MgCl_2$ is expensive and water is effective for dust abatement for short durations, haul routes that

will be used for short durations with less traffic may receive water for dust abatement. These include most of the 40 miles of graveled and 34 miles of native surfaced roads.

Water drafting (pumping) in the action area streams may be necessary for providing water for dust abatement. The procedures and BMPs for water pumping from streams are described below in the Water Pumping Section.

1.3.1.5 Water Pumping

Water drafting for dust abatement and project related burning activities will occur. There are no pre-designated sites; however, when water is used, any drafting sites will be approved by a fisheries biologist or hydrologist. Typical locations are small, non-fish bearing headwater streams with relatively low flow. A typical technique is for culverts to be partially blocked with boards and visqueen in order to create small pools for pumping water. Culverts are not blocked in their entirety allowing water to flow over the top of the boards. Water is pumped into tank trucks for use on roads and during burning operations. Filling firefighting engines would often occur at the Ranger Station; however, sites near treatment areas may also be used. The equipment used to remove water from streams will meet NMFS screening criteria (NMFS 2022b). All materials will be removed upon completion of the withdrawal activities.

Guidelines found in NOAA Fisheries WCR Anadromous Salmonid Passage Design Manual 2022 (NMFS 2022b; <https://www.fisheries.noaa.gov/resource/document/anadromous-salmonid-passage-facility-design>) will be utilized for all water pumping activities associated with dust abatement and fire safety. A qualified fisheries biologist will inspect all pumping locations. In addition to the guidelines (NMFS 2022b), BMPs for pumping are as follows:

- Water surface elevations should not decrease more than 10 percent.
- No more than 10 percent of streamflow shall be pumped.
- Upstream and downstream juvenile and adult passage will be maintained.
- Instream withdrawal sites will be constructed such that they minimize streambed alteration.
- Pump intakes and intake screens will meet the criteria found in NMFS (2022b). Use of a “Frog Box” must meet NMFS’ (2022b) intake criteria.
- Spill containment materials for portable pumps, such as absorbent diapers, spill kits, or physical containment, will be required on site.
- Individual gas can capacity will not exceed 5 gallons, with no more than 10 gallons total, when stored in riparian areas to facilitate refueling of portable pumps.

1.3.1.6 *Petroleum Fuels*

Machinery is used in harvest and road work activities and will require fuel and maintenance to operate. The BMPs to reduce the chance of petroleum products entering the water and causing harm to ESA-listed fish from harvest and road machinery are listed at end of the Proposed Road Work section (Section 1.3.2).

1.3.2 Proposed Road Work

The NPCNF proposes to recondition, reconstruct, and decommission roads, and construct new, temporary roads (Table 3). Primary components of these activities are described below.

Table 3. Proposed road work by subwatershed (HUC 12). Road columns are in miles and culvert columns are in number of culverts.

Subwatershed	Reconditioning and Reconstruction			Temporary	Decommissioning	
	Road Recondition	Road Reconstruction	Stream Culvert Replacements		Road Construction	Road Decommission
Clear Creek	3.7	4.8	9	2.9	0.6	0
Hoodoo Creek	8.5	16.1	14	5.9	0.8	0
South Fork Clear Creek	3.5	17.3	24	1.5	0	0
Kay Creek	0.5	4.9	6	0.5	0.9	0
Middle Fork Clear Creek	1.5	3.9	3	1.5	0.9	1
Pine Knob Creek	4.4	5.7	2	0.2	2.6	0
Brown Springs Creek	5.7	12.3	4	1.9	4.5	5
Solo Creek	1.6	6.7	4	1.3	1.4	1
Big Cedar Creek	1.5	3.6	0	1.1	1.5	6
Lower Clear Creek Face - Forest Private	0	0	0	0.3	0	0
	1.6	1.5	0	0	0	0
Total	32.5	76.8	66	17.1	13.2	13

1.3.2.1 *New Temporary Roads*

The NPCNF proposes 17.1 miles of temporary roads to access timber harvest units with approximately 9 miles of these as new construction and approximately 8 miles being built on existing road templates. These existing roads will be opened, will be used for haul as “temporary roads,” and decommissioned after use. The decommissioning of these temporarily reopened existing roads has already undergone consultation (West Fork/South Fork Road Decommissioning; Clear Ridge Decommissioning, NMFS No: WCR-2014-1795). New temporary roads will be built on or near ridge-tops and will not cross streams, so stream crossing construction is not required. New

roads will be narrower than existing system roads to reduce the size of the footprint on the landscape. All temporary roads, including any non-system roads used, would be constructed, or reconstructed, and obliterated within 4 years. Obliteration includes de-compaction, recontouring where needed and the application of woody material onto the de-compacted surfaces to provide for soil productivity and limit erosion potential. Temporary roads built on existing templates will be stabilized using recontouring or decompaction. If overwintered, roads would be placed in a hydrologically stable condition to limit erosion and motorized access would be prevented.

1.3.2.2 Road Reconditioning and Reconstruction

Road reconstruction and reconditioning will occur on roads proposed for haul. The amount of road preparation needed for haul can vary. System roads currently maintained for haul may require none or very little maintenance. Proposed haul roads that have been closed for decades may be overgrown with trees and require full reconstruction. Road preparation can be partial or discontinuous, and every element of reconditioning or reconstruction will not be needed for the full length of every mile of proposed haul road. There are seven timber sales proposed with road preparation typically occurring the year before, but may be the year of, the timber sale. Ongoing maintenance of haul routes is commensurate with use.

Up to 32.5 miles of road will be reconditioned and involves general road maintenance on existing roads that are used for log hauling. It includes roadside brushing, blading, ditch cleaning and spot placement of aggregate where currently absent and is designed to provide for safe passage of vehicles and road surface erosion control.

Up to 76.8 miles of road will be reconstructed which can include culvert replacements or upgrades, the addition of cross drain structures near stream crossings, application of surface aggregate gravel materials, and road realignment or reshaping. Adding cross drains minimizes sediment delivery to streams by diverting water to the forest floor where sediment is filtered out. New cross drains will be placed within 200 feet of stream crossings to minimize the length of road surface draining to stream crossings. Other cross drains may be added as needed to reduce cumulative ditch flow. On reconstructed road segments, cross drains would be installed prior to road prism shaping and ditch reconstruction activities that are upslope of the new cross drain sites, such that sediment generated from these activities would not drain to the stream. None of the 66 stream crossing culvert replacements occur on fish-bearing streams and will not require fish salvage. Three culverts will be monitored for turbidity and steelhead presence during replacement because the streams are large enough to potentially have steelhead. Work areas will be surveyed for steelhead prior to beginning work, and if found prior to work, block nets will be used to herd fish out of the area and the nets left in place to prevent their return, and if turbidity reaches 50 Nephelometric Turbidity Unit (NTU), work will stop until turbidity subsides. One culvert replacement is within 600 feet of critical habitat (South Fork Clear Creek), and two are within about a quarter of a mile of known steelhead presence. Turbidity monitoring is part of the monitoring plan to help characterize effects from the project and to reduce sediment transport to critical habitat. Steelhead have not been observed at these three sites over the past 6 years. Culvert replacements will occur after July 15 to take advantage of the lower flows and reduced potential for sediment transport. The BMPs for road reconditioning, reconstruction, decommissioning, and culvert work are similar and described below.

1.3.2.3 Road Decommissioning

The NPCNF proposes to decommission 13.2 miles of unneeded roads. Decommissioning improves hydrologic and soil function and can range from full recontouring to match the adjacent hillslope to abandonment. Proposed decommissioning will include the removal of 13 culverts (in non-fish-bearing streams) and reshaping, to match the surrounding terrain, of any stream, seep, or wetland crossing where they occur.

Road decommissioning includes activities that result in improved hydrologic and soil function in the watershed. It includes the removal and reshaping of any stream, seep, or wetland crossing where they occur on roads that are decommissioned. The NPCNF will decommission 13.2 miles of road, and each road will receive a site-specific prescription depending on characteristics such as the size of cuts and fills, hill slopes, and erosion risks. Prescriptions may include the following:

- Removing any metal culverts and other drainage structures and associated fills.
- Pulling up fill material where there are existing or potential failures, or where the fill is determined to be unstable. Treatments along stream crossings require a complete recontour of all fill material and with stream channels restored to natural grade and dimensions.
- Laying entire or selected portions of the road to original contours or the angle of repose of the fill material.
- Out-sloping the road surface.
- Diverting streams via temporary culvert or non-eroding, water-tight diversion. Settling basins or other methods will be used to ensure that muddy water does not return to the streams. Diversions will be installed, operated, and removed such that erosion and sedimentation are minimized.
- Removing gates after applying wood and rock debris across the de-compacted road surface to prevent vehicle usage.

1.3.2.4 Culvert Replacement and Removal

The NPCNF will replace 66 stream crossing culverts on haul routes and remove 13 culverts during road decommissioning. The NPCNF and its contractors will integrate the following conservation measures/BMP during all road work near and in streams (including culvert removals and the culvert replacements noted above), to minimize potential adverse effects on ESA-listed species and their critical habitat:

Culverts and Bare Soils

- Instream work will occur after July 15 for the three culvert replacements monitored for turbidity.

- Removable sediment traps will be placed below work areas to trap fines.
- When working instream, all fill around pipes will be removed prior to bypass and pipe removal.
- Install and operate stream diversions such that erosion and sedimentation is minimized.
- Work sites will be dewatered prior to culvert removal and rewatered slowly following completion of culvert work.
- Erosion control mats will be used on stream channel slopes and slides.
- Decommissioned stream crossings will be recontoured and banks reinforced with onsite materials.
- Replacement culvert inlets and outlets will be stabilized using log or rock weirs or armoring.
- Construct erosion control features, such as ditch relief culverts and sediment detention basins, and perform erosion control measures such as rocking ditches.
- Halt construction during heavy precipitation events to reduce potential sediment.
- Dispose of removed culverts, fill material, and other structural materials off NFS ground and away from live water.
- Disturbed soils will be re-vegetated with weed-free grasses for short-term erosion protection and with shrubs and trees for long-term soil stability.
- Bare soils will receive mulching with native materials, where available, or using weed-free straw to ensure coverage of exposed soils.

Fuels

- Fuels will be stored outside of RHCAs.
- All motorized equipment (including chainsaws and other hand power tools) will be fueled and serviced at least 100 feet away from streams in an area that will not deliver fuel, oil, etc. to riparian areas and streams.
- All equipment used in the stream and in riparian areas will be cleaned of external oil, dirt and mud; and repair abnormal leaks prior to arriving at the project site.
- Equipment with leaking fluids will not be used and fluid leaks will be repaired immediately.

- For road work, absorbent material manufactured for containment and cleanup of hazardous material will be kept on the job site.
- The Contracting Officer will be notified of hazardous spills.

The NPCNF will obtain any required permits for disturbance of water or wetlands prior to initiating work (COE 404 permit, Idaho Department of Water Resources Stream Alteration Permit). All related permit mitigation measures/BMP practices will be incorporated into project plans and contractor specifications.

1.3.3 Monitoring

The following implementation and effectiveness monitoring, as taken from the BA and the 2022 BA Addendum, has been incorporated into the proposed action:

The purpose of the monitoring is to determine if harvest and/or road improvement activities are contributing enough sediment to the stream to cause changes to channel morphology and/or degradation of habitat quality for steelhead. For the transect station at the NFS boundary, this plan evaluates potential changes to the physical habitat (e.g., spawning gravels), the physical processes (e.g., channel aggradation) and stream temperature and turbidity. The transect monitoring station is located where intrinsic potential for steelhead is very high. This station, and all other channel attribute and turbidity monitoring stations, are pictured in Figure 4. Potential ecological damage monitoring (PED) of drainage condition on active haul routes is ongoing to quickly identify potential or actual sediment delivery sources and correct the problem(s) within days.

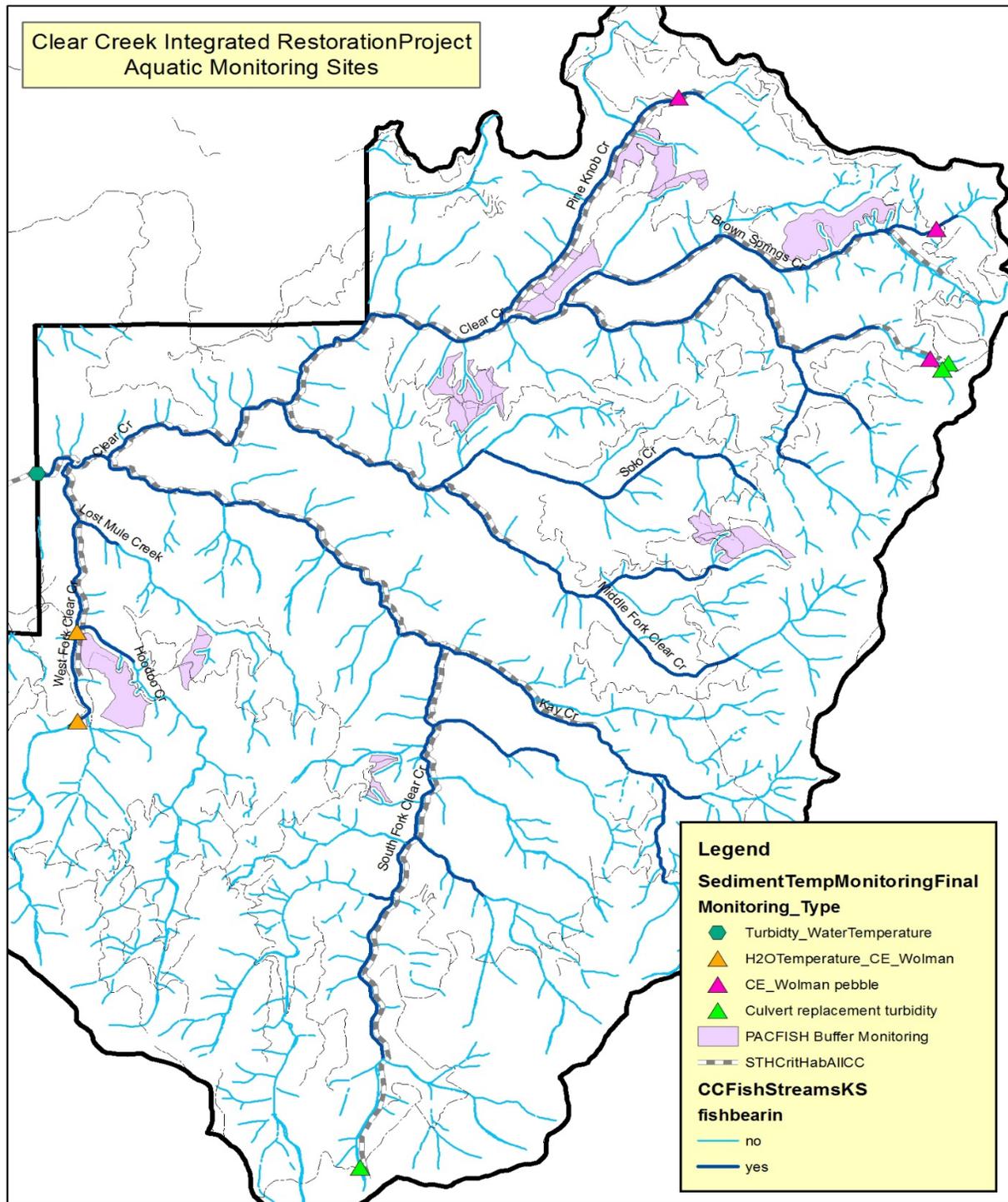


Figure 4. Locations of all proposed monitoring stations. At the blue hexagon at the Forest boundary there will be comprehensive transect monitoring to detect changes in physical stream characteristics. Water temperature will be monitored at the orange triangles. Substrate monitoring will occur at red triangle. Culvert replacements with turbidity monitoring will occur at green triangles.

1.3.3.1 Transect Monitoring Station at the Forest Boundary

The variables that will be monitored at the NFS boundary station (Figure 4) are stream channel physiography, water temperature, stream bed surface substrate, cobble embeddedness (CE), and fish presence and abundance.

- Stream channel physiography: The bases for these measurements are described in Harrelson, et al. (1994).
 - This monitoring station has three (3) monumented cross-sections. The cross-sections are spaced 100 feet apart (measured at the thalweg).
 - The monitoring station has one thalweg/longitudinal profile, starting at the downstream monumented cross-section, and extending upstream for a distance of 500 feet. The endpoint of the thalweg/longitudinal profile is monumented.
 - Stream discharge will be measured each year that channel physiography is measured (this is necessary for calibrating Manning's roughness coefficient; needed for calculating sediment transport capacity).
- Stream bed surface substrate
 - Bed surface substrate is measured using a modified Wolman Pebble Count procedure described in Harrelson, et al. (1994). The modifications are as follows:
 - Pebbles are measured in a zig-zag pattern, starting at the downstream monumented cross-section, and continuing to the upstream end of the monumented thalweg/longitudinal profile.
 - Measurements of the medial axis are measured and recorded to the nearest millimeter (mm); not tallied into Wentworth phi-classes.
 - A minimum of 300 particles will be measured at each station.
- Cobble embeddedness
 - Three measurements are conducted at each of the stream channel cross section locations (described above); taken at 25 percent, 50 percent, and 75 percent locations within the cross-section width. A total of nine (9) measurements will be taken at each station.
 - Measurements would be taken as described in Skille and King (1989).

- Temperature/Turbidity
 - Stream temperature and turbidity monitoring will occur in coordination with the U.S. Geological Survey. A cableway and temperature and turbidity monitoring instrument will be installed and data collected from April through October for a minimum of 5 years.

- Fish Presence and Abundance
 - Single pass snorkel surveys would be conducted in the same year that the stream channel physiography measurements are made.
 - The number and species observed would be recorded. The length and width of the snorkeled area would also be measured in order to determine area and calculate fish densities.

- Monitoring Frequency: this plan proposes both pre- and post-project monitoring timeframes.
 - Pre-project
 - The boundary transect site was measured and monitored in 2015 and 2016.
 - The site will be re-measured at least one additional time prior to the commencement of operations.
 - The temperature and turbidity instrument was installed at the NFS boundary in 2019. Data collection began in the summer of 2019.
 - Project
 - Monitoring would occur on the following schedule: year-1 after the Lost Mule (first sale) project activities begin, and will be repeated again in the third, fifth, and every 5 years until all harvest is complete.
 - Temperature and turbidity monitoring at the NFS boundary will occur every year from April through October for a minimum of 5 years.

If the monitoring as described above indicates that a statistically significant change in CE, stream channel physiography, and/or streambed surface substrate has occurred, the change will be assessed by examination of anomalies in climate and/or precipitation that may have caused a bankfull or near bankfull flow event.

If this assessment indicates that changes may have occurred from implementation of project activities, the following would be conducted as soon as practicable (e.g. if snow conditions preclude access), in the order listed:

1. Field assessment of all implemented, ground disturbing activities to determine the source of any erosion and delivery of sediment to streams.
2. Compilation of a report to be submitted to NMFS and U.S. Fish and Wildlife Service (USFWS) within a month following the field assessment containing the results of this field assessment; and
3. Re-initiation of consultation for some or all of the remaining, unimplemented activities if consensus opinion of the Central Idaho Level 1 Team deems it necessary, prior to implementation of these activities.

1.3.3.2 Implementation/Effectiveness Monitoring

1. PACFISH implementation monitoring would be conducted annually by the NPCNF fisheries biologist in conjunction with BMP audits. Monitoring would be conducted on randomly selected treatment units throughout the NPCNF. Results would be made publicly available on the NPCNF's website. Both implementation and effectiveness of treatments would be monitored. Additional monitoring of sediment movement through RHCAs would be conducted in Clear Creek (Figure 4). The focus of the monitoring would be measuring whether or not sediment travels from harvested and burned units into RHCAs and also how far the sediment travels, and whether or not it reaches a stream. This monitoring would be conducted on portions of the following regeneration harvest units after burning of the units has occurred: # 109, 130, 155, and 160. This monitoring would also be conducted in the following commercial thin units after harvest: 214, 218, and 315.
2. Two temperature monitoring are in West Fork Clear Creek to monitor potential changes in temperature from timber harvest (Figure 4).
3. Implementation monitoring of road reconstruction and reconditioning activities would occur on all reconstructed segments, on which log-haul occurs or is planned to occur, to verify that timing of reconstruction activities adheres to times shown in Figure 2 in the BA, and that implementation of proposed activities and design features has corrected current sources of sediment and reduced it. Haul roads are surveyed prior to haul to identify safety and sediment issues. These issues are corrected prior to haul using road design features such as installation of cross drains, culvert replacements, and surface gravelling. A complete list of these design features can be found in the BA under the Proposed Road Work section.
4. Turbidity and steelhead presence monitoring at three culvert replacement sites, one of which is in steelhead designated critical habitat, would occur during implementation. Of

these three culverts, two are on Clear Creek and one is on the South Fork Clear Creek. These are on Figure 4. Prior to work, a background turbidity will be taken above the culvert replacement site. During dewatering and rewatering, turbidity will be monitored within 600 feet downstream of the culvert replacement. If turbidity exceeds 50 NTU, work or rewatering will be slowed until turbidity is reduced to below 50 NTU.

5. Monitoring and inspections of haul road preparation, road conditions during haul and after wet weather, and harvest areas would be continuous throughout implementation of the Project. Specific and more regular inspections would occur on Roads 286, 650, 1106, and 1114. Haul inspections would occur regularly (approximately every few days) while active haul is occurring. The roads would be regularly inspected by a Sales Administrator during haul to ensure erosion is not occurring in an amount and location that would result in sediment delivery to streams. The contractors or a Sales Administrator would decide whether to cease haul during wet periods when haul trucks create ruts greater than 3 inches deep for 50 feet. Following the wet periods when haul is ceased, all active haul roads would be inspected for signs of potential ecological damage (PED) within 2 working days of roads becoming drivable and before haul resumes. Signs of PED are those with the potential to deliver sediment and are of a scale that requires repair by mechanical equipment. The PEDs include, but are not limited to, sediment delivery to a perennial stream, excessive ditch scour, or ditch or culvert blockage. Within the 2 working days of inspection, the contractor would be directed to correct the cause of the PED condition within 4 days following notification. A log that identifies all PEDs and documents NPCNF and contractor compliance during the corrective 4-day time frame would be kept.
6. Instream substrate monitoring associated with log-haul would occur at a total of four sites, on Roads 1114 (Pine Knob), 286 (Brown Springs and Clear Creek), and 650 (West Fork Clear Creek) where these main haul routes cross on or upstream of steelhead designated critical habitat (Figure 4, above). Intrinsic steelhead habitat potential is moderate to low at the stream crossings to be monitored. The objective is to measure changes in CE and substrate composition using Wolman pebble counts (particularly fines less than 6 mm) that may be associated with log-haul activities. If negative changes are occurring, actions would be taken to assess the entry location and address the haul or road design criteria if necessary. All sampling sites occur in designated critical habitat in a response reach ranging from 3 percent to 4 percent stream gradient. Monitoring would be conducted once per year in the early summer when hauling occurs on the road. This would allow time for data analysis and resolution of identified problems prior to the fall rains and next hauling season. Monitoring would be conducted for 5 years. Monitoring at any of these stations will be discontinued if a natural sedimentation event, such as a landslide, precludes detection of project related sediment effects. If project related sediment effects are detected, the source will be determined and corrective actions taken to limit the sediment source. Results and information on any corrective actions would be provided to NMFS and USFWS annually.
7. Cross drain culvert monitoring would occur on Forest Roads 650 and 286, the two primary routes used for harvest hauling and access activities. The intent of the

monitoring is to demonstrate the effectiveness of the cross drains in directing road related sediment away from live stream crossings. Monitoring would include identification of all cross drains on these two roads, measurement of the width and length of any sediment track leading from the cross drain downhill, and whether or not the sediment track reached a live stream. Where delivery was observed, additional measures would be taken to alleviate the delivery. Initial measurements were collected in 2018 and would be repeated on the segments of road where haul is occurring two years after hauling activities begin. Measurements would be taken in late spring/early summer in order to determine if drainage improvements are needed prior to fall season rains. If sediment is found to reach a stream, drainage improvements would be implemented to alleviate further delivery. There are over 200 cross drains on Road 286 and over 150 on Road 650. Initial measurements in 2018 found no detectable delivery to streams.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

This opinion replaces the previous biological opinion, NMFS No. WCRO-2019-00545, for this project.

2.1 Analytical Approach

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

This biological opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation of critical habitat for SRB steelhead uses the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced these terms 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 opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion we use the terms “effects” and “consequences” interchangeably.

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

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that 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’ “reproduction, numbers, or distribution” for the jeopardy analysis. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species. The Federal Register notices and notice dates for the species and critical habitat listings considered in this opinion are included in Table 4.

Table 4 Listing status, status of critical habitat designations and protective regulation, and relevant Federal Register (FR) decision notices for Endangered Species Act-listed species considered in this opinion.

Species	Listing Status	Critical Habitat	Protective Regulations
Steelhead (<i>O. mykiss</i>)			
Snake River Basin	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Note: Listing status ‘T’ means listed as threatened under the ESA.

2.2.1 Status of the Species

This section describes the present condition of the SRB steelhead distinct population segment (DPS). NMFS expresses the status of a salmonid ESU or DPS in terms of likelihood of persistence over 100 years (or risk of extinction over 100 years). NMFS uses McElhany et al.’s (2000) description of a viable salmonid population (VSP) that defines “viable” as less than a 5 percent risk of extinction within 100 years and “highly viable” as less than a 1 percent risk of extinction within 100 years. A third category, “maintained,” represents a less than 25 percent risk of extinction within 100 years (moderate risk of extinction). To be considered viable, an ESU or DPS should have multiple viable populations so that a single catastrophic event is less likely to cause the ESU/DPS to become extinct, and so that the ESU/DPS may function as a metapopulation that can sustain population-level extinction and recolonization processes (ICTRT 2007). The risk level of the ESU/DPS is built up from the aggregate risk levels of the individual populations and major population groups (MPGs) that make up the ESU/DPS.

Attributes associated with a VSP are: (1) abundance (number of naturally-produced adult spawners in natural production areas); (2) productivity (number of naturally-spawning adult progeny produced per parent); (3) spatial structure (both to the spatial distributions of individuals in the population and the processes that generate that distribution); and (4) diversity (distribution of traits within and among populations, ranging in scale from DNA sequence variation in single genes to complex life history traits). A VSP needs sufficient levels of these four population attributes in order to: safeguard the genetic diversity of the listed ESU or DPS; enhance its capacity to adapt to various environmental conditions; and allow it to become self-sustaining in the natural environment (ICTRT 2007). These viability attributes are influenced by survival, behavior, and experiences throughout the entire salmonid life cycle, characteristics that are influenced in turn by habitat and other environmental and anthropogenic conditions. The present risk faced by the ESU/DPS informs NMFS’ determination of whether additional risk will appreciably reduce the likelihood that the ESU/DPS will survive or recover in the wild.

The following sections summarize the status and best available information on the species and designated critical habitats considered in this opinion based on the detailed information provided by the ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon and SRB steelhead (NMFS 2017a), Biological Viability Assessment Update for Pacific Salmon and steelhead Listed Under the Endangered Species Act: Pacific Northwest (Ford 2022), and 2022 5-Year Review: Summary and Evaluation of SRB steelhead (NMFS 2022a). These three documents are incorporated by reference here.

2.2.1.1 Snake River Basin Steelhead

The SRB steelhead was listed as a threatened ESU on August 18, 1997 (62 FR 43937), with a revised listing as a DPS on January 5, 2006 (71 FR 834). This DPS occupies the SRB, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the mainstem Snake and Columbia Rivers, loss of habitat above the Hells Canyon Dam complex on the mainstem Snake River, and widespread habitat degradation and reduced streamflows throughout the SRB (Good et al. 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in the aggregate run of SRB steelhead over Lower Granite Dam (Good et al. 2005; Ford 2022; NMFS 2022a). In the agency's 5-year review for Pacific salmon and steelhead, NMFS concluded that the species should remain listed as threatened (NMFS 2022a).

Life History. Adult SRB steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the SRB, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

Spatial Structure and Diversity. This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the SRB of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of six artificial propagation programs (85 FR 81822). The artificial propagation programs include the Dworshak National Fish Hatchery, Salmon River B-run, South Fork Clearwater B-run, East Fork Salmon River Natural, Tucannon River, and the Little Sheep Creek/Imnaha River programs. The SRB steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The Interior Columbia Basin Technical Recovery Team (ICTRT) identified 24 extant populations within this DPS, organized into five MPGs (ICTRT 2003). The ICTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. The five MPGs with extant populations are the Clearwater River, Salmon River, Grande Ronde River, Imnaha River, and Lower Snake River. In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, current VSP (spatial structure, diversity, abundance, and productivity) risk ratings are shown in Table 5.

SRB steelhead exhibit a diversity of life-history strategies, including variations in fresh water and ocean residence times. Traditionally, fisheries managers have classified these steelhead into two groups, A-run and B-run, based on ocean age at return, adult size at return, and migration timing. A-

run steelhead predominantly spend 1 year in the ocean; B-run steelhead are larger with most individuals returning after 2 years in the ocean. Most Snake River populations support a mixture of the two run types, with the highest percentage of B-run fish in the upper Clearwater River and the South Fork Salmon River; moderate percentages of B-run fish in the Middle Fork Salmon River; and very low percentages of B-run fish in the Upper Salmon River, Grande Ronde River, and Lower Snake River (Ford 2022). Maintaining life history diversity is important for the recovery of the species.

The spatial structure risk is considered to be low or very low for the vast majority of populations in this DPS. This is because juvenile steelhead (age-1 parr) were detected in 97 of the 112 spawning areas (major and minor) that are accessible by spawning adults (Ford 2022). Diversity risk for populations in the DPS is either moderate or low. Large numbers of hatchery steelhead are released in the Snake River, and while new information about the relative abundance of natural-origin spawners is available, the relative proportion of hatchery adults in natural spawning areas near major hatchery release sites remains uncertain (Ford 2022). Reductions in hatchery-related diversity risks would increase the likelihood of these populations throughout the DPS reaching viable status.

Table 5. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the SRB steelhead distinct population segment (Ford 2022; NMFS 2017a; NMFS 2022a). The Lower Mainstem Clearwater River population will be affected by the action.

Major Population Group	Population ²	VSP Risk Rating ¹		Viability Rating	
		Abundance/Productivity	Spatial Structure/Diversity	2022 Assessment	Proposed Recovery Goal ³
Lower Snake River ⁴	Tucannon River	High	Moderate	High Risk	Highly Viable or Viable
	Asotin Creek	Low	Moderate	Viable	Highly Viable or Viable
Grande Ronde River	Lower Grande Ronde	High	Moderate	High Risk	Viable or Maintained
	Joseph Creek	Low	Low	Viable	Highly Viable, Viable, or Maintained
	Wallowa River	High	Low	High Risk	Viable or Maintained
	Upper Grande Ronde	Very Low	Moderate	Viable	Highly Viable or Viable
Imnaha River	Imnaha River	Very Low	Moderate	Viable	Highly Viable
Clearwater River (Idaho)	Lower Mainstem Clearwater River	Very Low	Low	Highly Viable	Viable
	South Fork Clearwater River	Very Low	Moderate	Viable	Maintained
	Lolo Creek	High	Moderate	High Risk	Maintained
	Selway River	Moderate	Low	Maintained	Viable
	Lochsa River	Moderate	Low	Maintained	Highly Viable
	North Fork Clearwater River			<i>Extirpated</i>	<i>N/A</i>

Major Population Group	Population ²	VSP Risk Rating ¹		Viability Rating	
		Abundance/Productivity	Spatial Structure/Diversity	2022 Assessment	Proposed Recovery Goal ³
Salmon River (Idaho)	Little Salmon River	Very Low	Moderate	Viable	Maintained
	South Fork Salmon River	Moderate	Low	Maintained	Viable
	Secesh River	Moderate	Low	Maintained	Maintained
	Chamberlain Creek	Moderate	Low	Maintained	Viable
	Lower Middle Fork Salmon River	Moderate	Low	Maintained	Highly Viable
	Upper Middle Fork Salmon River	Moderate	Low	Maintained	Viable
	Panther Creek	Moderate	High	High Risk	Viable
	North Fork Salmon River	Moderate	Moderate	Maintained	Maintained
	Lemhi River	Moderate	Moderate	Maintained	Viable
	Pahsimeroi River	Moderate	Moderate	Maintained	Maintained
	East Fork Salmon River	Moderate	Moderate	Maintained	Maintained
Salmon River (Idaho)	Upper Mainstem Salmon River	Moderate	Moderate	Maintained	Maintained
Hells Canyon	Hells Canyon Tributaries			<i>Extirpated</i>	

¹Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.

²Populations shaded in gray are those that occupy the action area.

³There are several scenarios that could meet the requirements for ESU recovery (as reflected in the proposed goals for populations in Oregon and Washington). What is reflected here for populations in Idaho, are the proposed status goals selected by NMFS and the State of Idaho.

⁴At least one of the populations must achieve highly viable.

Abundance and Productivity. Historical estimates of steelhead production for the entire SRB are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good et al. 2005). The Clearwater River drainage alone may have historically produced 40,000 to 60,000 adults (Ecovista et al. 2003), and historical harvest data suggests that steelhead production in the Salmon River was likely higher than in the Clearwater (Hauck 1953). In contrast, at the time of listing in 1997, the 5-year geometric mean abundance for natural-origin steelhead passing Lower Granite Dam, which includes all but one population in the DPS, was 11,462 adults (Ford 2011). Abundance began to increase in the early 2000s, with the single year count and the 5-year geometric mean both peaking in 2015 at 45,789 and 34,179, respectively (ODFW and WDFW 2022). Since 2015 (Table 6), the single year count at Lower Granite Dam declined to a low of 8,284 in spawn year 2019 and the 5-year geometric means have declined steadily to a low of 11,557 natural-origin adult returns in 2021 (ODFW and WDFW 2022).

Table 6. Natural origin adult steelhead counts over Lower Granite Dam (ODFW and WDFW 2022). Reports lag one year with 202 counts not available until 2023.

Spawn Year	Count	5-year Geometric Mean
2015	45,789	34,197
2016	33,936	32,446
2017	15,576	26,945
2018	10,717	23,100
2019	8,284	18,469
2020	9,634	13,522
2021	15,478	11,557

Clearwater MPG. The proposed action will occur in the Clear Creek watershed, which is occupied by the Lower Clearwater Mainstem steelhead population in the Clearwater MPG. The Clearwater River MPG is not viable. The only large population (Lower Mainstem) is rated at highly viable. For the MPG to be viable, two additional populations must be viable and the remaining populations must be rated as at least maintained (Table 5). The SF Clearwater population is rated as viable; however, the Lolo population is rated as high risk, and the Lochsa and Selway populations are rated as maintained. The Lolo population is a small size (“basic”) population expected to maintain a mean abundance of at least 500 adults for viability; however, this population apparently has had less than 200 adults for the last few years, through the 2020/21 return (NMFS 2022a). With current viability assessments, minimum abundance must improve enough to make one more population “viable” and the remaining two reach the minimum abundance for a viability of “maintained.”

Lower Mainstem Clearwater River Population- Clear Creek Major Spawning Area. Current spawning is widely distributed throughout the Lower Mainstem Clearwater River population area and has been documented in all of the larger tributaries to the Lower Mainstem Clearwater River including Clear Creek. Run reconstruction models estimate hatchery steelhead comprise approximately 83 percent of steelhead spawners for both the Clearwater River (SRRW 2021) and for the Lower Mainstem Clearwater population (Stark et al. 2021). Habitat limiting factors for this population include lack of high-quality juvenile rearing areas, natural flow regimes, sediment, riparian condition and large wood, habitat complexity, floodplain connectivity, stream temperature, and migration barriers. (NMFS 2017a; NMFS 2022b).

Clear Creek serves as an important spawning and rearing tributary for the Lower Mainstem Clearwater River population. The Clear Creek watershed is one of six major spawning areas in the Lower Mainstem Clearwater River population area. Although the population as a whole has sufficient abundance and productivity to rate as low risk in the most recent 5-year review, abundance and productivity in Clear Creek appears to be relatively low. For instance, from 2013 through 2018, which includes some years of relatively high abundance for the DPS and population as a whole, an average of 52 wild steelhead adults (range 0 to 208) returned to Clear Creek (Unpublished data from the Nez Perce Tribe, May 12, 2022).

The proposed action includes haul on the 1106 road which is in the South Fork Clearwater drainage. Road 1106 will carry 19 percent, or 9 MMBF of the total proposed haul and runs along Green Creek

for 1.4 miles before intersecting with paved State Highway 14. The South Fork Clearwater River population is currently rated as viable, more than meeting its proposed recovery goal.

For the current 5-year review, the Lower Mainstem population's viability rating is highly viable (NMFS 2022a), consistent with its recovery goal of viable (low risk) or highly viable (very low risk; NMFS 2017a). Although genetic risk for this population has been shown to be low, large numbers of in- and out-migrating hatchery fish pass through the population area and it is uncertain how many juveniles become resident, and adults spawn, within the Lower Mainstem population area (NMFS 2017a). Low numbers of return spawners for the most recent 5-year review period 2016 to 2020 (NMFS 2022a) cause uncertainty and caution in assessing risk for the Lower Mainstem Clearwater River population.

Abundance and Productivity. Current abundance/productivity estimates for the Lower Clearwater Mainstem population exceed minimum thresholds for low risk status, with the population assigned a very low risk rating for abundance/productivity (Ford 2022).

Spatial Structure. Clear Creek is one of six major spawning areas for the population. Current spawning is distributed widely across the population and is presumed to occur in all major and most minor spawning areas. Based on the extensive branching of currently occupied habitat, the spatial structure risk for this population is very low, which is adequate for this population to reach its proposed status (Ford 2022).

Diversity. Although there is no within-population hatchery program, large numbers of hatchery fish share the mainstem Clearwater migration corridor with the Lower Mainstem Clearwater River population, and hatchery fish may stray into spawning areas such as Clear Creek. There is some diversity risk associated with the high degree of uncertainty regarding the contribution of those hatchery fish to natural spawning. However, the cumulative diversity risk for this population is low. A low diversity risk is adequate for this population to reach its proposed status (Ford 2022).

Limiting Factors. Elevated summer water temperatures, low summer stream flows, and loss of habitat complexity are likely to be the most significant factors affecting steelhead production in the Lower Mainstem Clearwater River population area as a whole (NMFS 2017). Other potential limiting factors relevant to Clear Creek and the proposed action are degraded floodplain connectivity and function from development (NMFS 2017).

Summary. Based on information available for the 2022 viability assessment, none of the five MPGs are meeting their recovery plan objectives and the viability of populations near hatchery release sites remains uncertain (Ford 2022). The recent, sharp declines in abundance are of concern and are expected to negatively affect productivity in the coming years. Overall, the best available information suggests that SRB steelhead continue to be at a moderate risk of extinction within the next 100 years. This DPS continues to face threats from tributary and mainstem habitat loss, degradation, or modification; predation; harvest; hatcheries; and climate change (NMFS 2022a). Both populations in the action area are at least viable and are meeting their recovery goals.

2.2.2 Status of Critical Habitat

In evaluating the condition of designated critical habitat, NMFS examines the condition and trends of PBFs which are essential to the conservation of the ESA-listed species because they support one or more life stages of the species. Proper function of these PBFs is necessary to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and the growth and development of juvenile fish. Modification of PBFs may affect freshwater spawning, rearing or migration in the action area. Generally speaking, sites required to support one or more life stages of the ESA-listed species (i.e., sites for spawning, rearing, migration, and foraging) contain PBF essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food) (Table 7).

Table 7. Types of sites, essential physical and biological features (PBFs), and the species life stage each PBF supports.

Site	Essential Physical and Biological Features	Species Life Stage
Snake River Basin Steelhead^a		
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity and floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage ^b	Juvenile development
	Natural cover ^c	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover ^c	Juvenile and adult mobility and survival

^a Additional PBFs pertaining to estuarine areas have also been described for Snake River steelhead. These PBFs will not be affected by the proposed action and have therefore not been described in this opinion.

^b Forage includes aquatic invertebrate and fish species that support growth and maturation.

^c Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Table 8 describes the geographical extent of critical habitat within the SRB for SRB steelhead. Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. In addition, critical habitat includes the adjacent riparian zone, which is defined as the area within 300 feet of the line of high water of a stream channel or from the shoreline of standing body of water (58 FR 68543). The riparian zone is critical because it provides shade, streambank stability, organic matter input, and regulation of sediment, nutrients, and chemicals.

Table 8. Geographical extent of designated critical habitat for SRB steelhead.

Distinct Population Segment (DPS)	Designation	Geographical Extent of Critical Habitat
Snake River Basin steelhead	70 FR 52630; September 2, 2005	Specific stream reaches are designated within the Lower Snake, Salmon, and Clearwater River basins. Table 21 in the Federal Register details habitat areas within the DPS's geographical range that are excluded from critical habitat designation.

Spawning and rearing habitat quality in tributary streams in the Snake River varies from excellent in wilderness and roadless areas to poor in areas subject to intensive human land uses (NMFS 2015; NMFS 2017a). Critical habitat throughout much of the Interior Columbia, (which includes the

Snake River and the Middle Columbia River) has been degraded by intensive agriculture, alteration of stream morphology (i.e., channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer streamflows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in non-wilderness areas. Human land use practices throughout the basin have caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations.

In many stream reaches designated as critical habitat in the SRB, streamflows are substantially reduced by water diversions (NMFS 2015; NMFS 2017a). Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence et al. 1996). Reduced tributary streamflow has been identified as a major limiting factor for SRB steelhead in particular (NMFS 2017a).

Many stream reaches designated as critical habitat for SRB steelhead are listed on the Clean Water Act 303(d) list for impaired water quality, such as elevated water temperature (IDEQ 2020). Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures, such as some stream reaches in the Upper Grande Ronde. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Water quality in spawning and rearing areas in the Snake River has also been impaired by high levels of sedimentation and by heavy metal contamination from mine waste (e.g., IDEQ and USEPA 2003; IDEQ 2001).

The construction and operation of water storage and hydropower projects in the Columbia River basin, including the eight run-of-river dams on the mainstem lower Snake and lower Columbia Rivers, have altered biological and physical attributes of the mainstem migration corridor. Hydrosystem development modified natural flow regimes, resulting in warmer late summer and fall water temperature. Changes in fish communities led to increased rates of piscivorous predation on juvenile salmon and steelhead. Reservoirs and project tailraces have created opportunities for avian predators to successfully forage for smolts, and the dams themselves have created migration delays for both adult and juvenile salmonids. Physical features of dams, such as turbines, also kill out-migrating fish. In-river survival is inversely related to the number of hydropower projects encountered by emigrating juveniles. However, some of these conditions have improved. The Bureau of Reclamation and the COE have implemented measures in previous Columbia River System hydropower consultations to improve conditions in the juvenile and adult migration corridor including 24-hour volitional spill, surface passage routes, upgrades to juvenile bypass systems, and predator management measures. These measures are ongoing and their benefits with respect to improved functioning of the migration corridor PBFs will continue into the future.

2.2.3 Climate Change Implications for ESA-listed Species and their Critical Habitat

One factor affecting the rangewide status of Snake River salmon and steelhead, and aquatic habitat at large is climate change. As observed by Siegel and Crozier in 2019, long-term trends in warming have continued at global, national, and regional scales. The five warmest years in the 1880 to 2019 record have all occurred since 2015, while 9 of the 10 warmest years have occurred since 2005

(Lindsey and Dahlman 2020). The year 2020 was another hot year in national and global temperatures; it was the second hottest year in the 141-year record of global land and sea measurements and capped off the warmest decade on record (<http://www.ncdc.noaa.gov/sotc/global202013>). Events such as the 2014-2016 marine heatwave (Jacox et al. 2018) are likely exacerbated by anthropogenic warming, as noted in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). The U.S. Global Change Research Program (USGCRP) reports average warming in the Pacific Northwest of about 1.3°F from 1895 to 2011, and projects an increase in average annual temperature of 3.3°F to 9.7°F by 2070 to 2099 (compared to the period 1970 to 1999), depending largely on total global emissions of heat-trapping gases (predictions based on a variety of emission scenarios including B1, RCP4.5, A1B, A2, A1FI, and RCP8.5 scenarios). The increases are projected to be largest in summer (USGCRP 2018).

Climate change generally exacerbates threats and limiting factors, including those currently impairing salmon and steelhead survival and productivity. The growing frequency and magnitude of climate change related environmental downturns will increasingly imperil many ESA-listed stocks in the Columbia River basin and amplify their extinction risk (Crozier et al. 2019, 2020, 2021). This climate change context means that opportunities to rebuild these stocks will likely diminish over time. As such, management actions that increase resilience and adaptation to these changes should be prioritized and expedited. For example, the importance of improving the condition of and access and survival to and from the remaining functional, high-elevation spawning and nursery habitats is accentuated because these habitats are the most likely to retain remnant snowpacks under predicted climate change (Tonina et al. 2022).

Climate change is already evident. It will continue to affect air temperatures, precipitation, and wind patterns in the Pacific Northwest (ISAB 2007, Philip et al. 2021), resulting in increased droughts and wildfires and variation in river flow patterns. These conditions differ from those under which native anadromous and resident fishes evolved and will likely increase risks posed by invasive species and altered food webs. The frequency, magnitude, and duration of elevated water temperature events have increased with climate change and are exacerbated by the Columbia River hydrosystem (EPA 2020a, 2020b; Scott 2020). Thermal gradients (i.e., rapid change to elevated water temperatures) encountered while passing dams via fish ladders can slow, reduce, or altogether stop the upstream movements of migrating salmon and steelhead (e.g., Caudill et al. 2013). Additional thermal loading occurs when mainstem reservoirs act as a heat trap due to upstream inputs and solar irradiation over their increased water surface area (EPA 2020a, 2020b, 2021). Consider the example of adult sockeye salmon in 2015, when high summer water temperatures contributed to extremely high losses of Columbia River and Snake River stocks during passage through the mainstem Columbia and Snake River (Crozier et al. 2020), and through tributaries such as the Salmon and Okanogan rivers, below their spawning areas. Some stocks are already experiencing lethal thermal barriers during a portion of their adult migration. The effects of longer or more severe thermal barriers in the future could be catastrophic. For example, Bowerman et al. (2021) concluded that climate change will likely increase the factors contributing to prespawn mortality of Chinook salmon across the entire Columbia River basin.

Columbia River basin salmon and steelhead spend a significant portion of their life-cycle in the ocean, and as such the ocean is a critically important habitat influencing their abundance and

productivity. Climate change is also altering marine environments used by Columbia River basin salmon and steelhead. This includes increased frequency and magnitude of marine heatwaves, changes to the intensity and timing of coastal upwelling, increased frequency of hypoxia (low oxygen) events, and ocean acidification. These factors are already reducing, and are expected to continue reducing, ocean productivity for salmon and steelhead. This does not mean the ocean is getting worse every year, or that there will not be periods of good ocean conditions for salmon and steelhead. In fact, near-shore conditions off the Oregon and Washington coasts were considered good in 2021 (NOAA 2022). However, the magnitude, frequency, and duration of downturns in marine conditions are expected to increase over time due to climate change. Any long-term effects of the stressors that fish experience during freshwater stages that do not manifest until the marine environment will be amplified by the less-hospitable conditions there due to climate change. Together with increased variation in freshwater conditions, these downturns will further impair the abundance, productivity, spatial structure, and diversity of the region's native salmon and steelhead stocks (ISAB 2007, Isaak et al. 2018). As such, these climate dynamics will reduce fish survival through direct and indirect impacts at all life stages (NOAA 2022).

All habitats used by Pacific salmon and steelhead will be affected by climate dynamics. However, the impacts and certainty of the changes will likely vary by habitat type. Some changes affect salmon at all life stages in all habitats (e.g., increasing temperature), while others are habitat-specific (e.g., stream-flow variation in freshwater, sea-level rise in estuaries, upwelling in the ocean). How climate change will affect each individual salmon or steelhead stock also varies widely, depending on the extent and rate of change and the unique life-history characteristics of different natural populations (Crozier et al. 2008). The continued persistence of salmon and steelhead in the Columbia basin relies on restoration actions that enhance climate resilience (Jorgensen et al. 2021) in freshwater spawning, rearing, and migratory habitats, including access to high elevation, high quality cold-water habitats, and the reconnection of floodplain habitats across the interior Columbia River basin.

2.3 Action Area

“Action area” means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area includes the Clear Creek watershed (National Hydrography Dataset, hydrologic unit code 1706030401). The watershed includes the Lower, Upper, and South Fork Clear Creek subwatersheds and all streams in these subwatersheds. Green Creek is outside the Clear Creek watershed but is included in the action area because a haul route, Road 1106, crosses, and is adjacent to, Green Creek. Steelhead critical habitat is found in the three subwatersheds and on Green Creek (Figure 5).

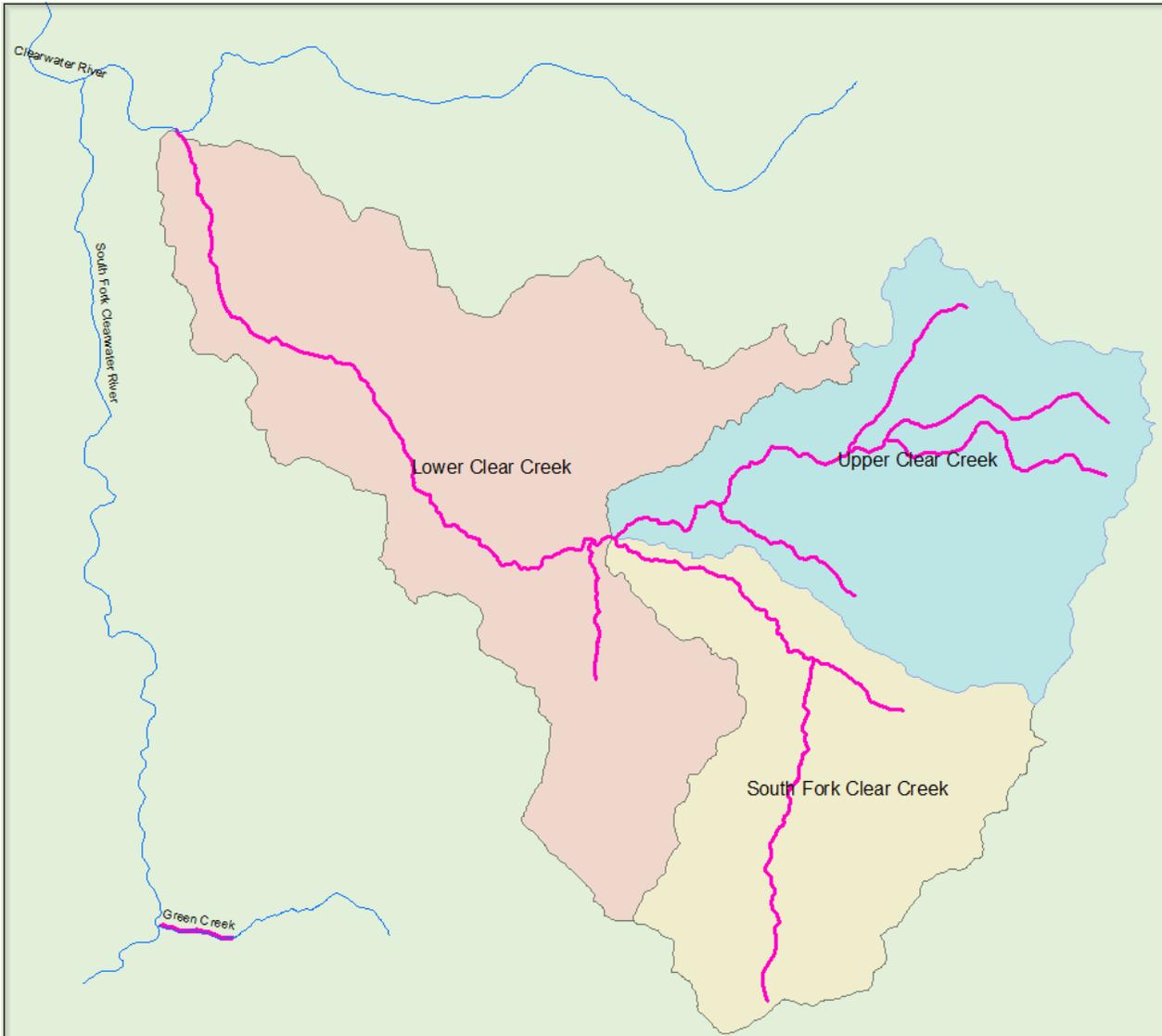


Figure 5. The action area including three subwatersheds (shaded) and critical habitat (pink lines).

The action area is used by all freshwater life history stages of threatened SRB steelhead. Streams within the action area are designated critical habitat for SRB steelhead (Figure 5). Designated critical habitat for SRB steelhead includes specific reaches of streams and rivers, as published in the Federal Register (70 FR 52630). The action area, except for areas above natural barriers to fish passage, is also EFH for Chinook and coho salmon (PFMC 2014), and is in an area where environmental effects of the proposed project may adversely affect EFH for this species.

2.4 Environmental Baseline

The “environmental baseline” refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present

impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

The action area is used by all freshwater life history stages of SRB steelhead. Steelhead are widely distributed throughout the action area and most streams where they are present are designated critical habitat. As discussed in the Status of the Species section (section 2.2.1.1), the action area is one of six major spawning areas for the Lower Mainstem Clearwater River population. This population must be viable or highly viable for the Clearwater MPG to be viable and for recovery of the DPS. In the most recent 5-year review, the Lower Mainstem Clearwater River population was rated as highly viable (NMFS 2022a). The natural production from the Clear Creek portion of the population nevertheless apparently remains low and should be improved to support the resiliency of this population to periodic, localized and larger disturbance events that affect portions of the population. The condition of designated critical habitats in the action area are described further below.

2.4.1 Watershed Overview

Clear Creek is a 5th field HUC tributary to the Middle Fork of the Clearwater River, entering at river mile 77, 2 miles east of Kooskia, Idaho. Clear Creek is approximately 20.5 miles in length and contains 164 miles of tributary streams (Johnson 1984). Of the 65,000-acre Clear Creek watershed, NPCNF administers approximately 43,000 acres (66 percent), the Idaho Department of Lands (IDL) administers 1,900 acres (3 percent), and private ownership accounts for the remaining 20,100 acres (31 percent). Within the NPCNF lands, there is a 9,200-acre Clear Creek roadless area (14 percent of the watershed, 27 percent of the NPCNF land).

The upper 11 miles of Clear Creek (43,000 acres) is contained within NPCNF land. There are eight NPCNF Plan prescription watersheds under NPCNF management (analogous in scope to 7th field HUCs; Figure 1): Pine Knob Creek, Brown Springs Creek, Clear Creek, Solo Creek, Middle Fork Clear Creek, South Fork Clear Creek, Kay Creek, and Hoodoo Creek (Hoodoo and the Middle Fork contain a small amount of IDL and/or private land). Two additional prescription watersheds, Big Cedar Creek and Lower Clear Creek (LCC) Face, are primarily owned by IDL and/or private parties; however, a small portion of their land (720 acres, or 13 percent, and 570 acres, or 5 percent, respectively) is managed by the NPCNF. The lands in the lower 9 miles of Clear Creek are primarily owned by IDL and/or private parties (21,100 acres combined). There are two NPCNF Plan prescription watersheds under complete IDL and/or private management in LCC: Little Cedar Creek and Leitch Creek.

Elevations in the Clear Creek watershed range from approximately 2,000 feet at the mouth of Clear Creek to 4,600 feet in the headwaters. Geologically, the area has a dissected mosaic of plutonic, volcanic, and sedimentary rocks distributed throughout the basin. The topography of the watershed is mountainous with slopes often over 70 percent paralleling the stream drainages and relatively flat ridge tops. Modeling predicts 4,850 acres (11 percent) of the NPCNF lands are landslide prone,

mostly occurring in the Clear Creek roadless area. The watershed is underlain by granitic and basalt geologies. The watershed has several natural bedrock falls that are barriers to fish passage.

Mean annual discharge at the mouth of Clear Creek is 121 cubic feet per second (cfs). Monthly average flow ranges from a low of 28 cfs in September to a high of 626 cfs in April. In the years 2017-2021, the average of available annual flow statistics near the mouth of Clear Creek (USGS gage 13337099; accessed October 21, 2022) was approximately 133 cfs. Approximately 84 percent of Clear Creek's average annual flow drains from NPCNF Lands. Low August flows were measured at two monitoring stations in the Clear Creek drainage giving us scale for tributary flow: 0.6 cfs in the West Fork Clear Creek, and 10 cfs in the lower mainstem near the Forest boundary (Stillwater 2015). Equivalent clear-cut acres (ECA) is a measure of canopy opening. Within the Clear Creek watershed, ECA averages 2 percent on NPCNF land and 6 percent on IDL and/or private land. This level of ECA will not substantially influence the flow regime of Clear Creek. Climactically, the Clear Creek watershed is in the snow-rain transition zone (Klos et al. 2014), has periodic flooding from rain-on-snow (ROS) events, and is predicted to have increases in future flooding from ROS events caused by a warming climate (Musselman et al. 2018). The 2015 Baldy Fire was the most recent wildfire in the action area, affected the South Fork Clear Creek subwatershed, had limited areal coverage and effect on ECA, was mixed severity with high intensity only near ridgetops, and has had seven years for ground cover to recover.

2.4.2 Previous Forest Actions and Non-Forest Uses

Harvest. Since 1960, both regenerative and thinning harvest (8,650 and 2,354 acres, respectively) have occurred on 26 percent of the 43,000 acres of NPCNF land within the Clear Creek watershed. Only 10 acres of thinning, all within Pine Knob Creek, have occurred since 2000. Ground disturbance occurred with this legacy harvest, resulting in additional long-term sediment delivery from upland landscapes (Dunne et al. 2001) and sedimentation of fish habitat (Kirchner et al. 2001). The greatest risk of sediment delivery from landslides from harvested areas, due to loss of root stability, occurs 4 to 10 years after harvest (Megan and King 2004). At present, because tree roots will have recovered for 22 to 60 years, hillslopes have regained stability and there is minimal additional landslide risk, when compared to natural, from the past harvest. In addition, bare soil and bare streambank areas can increase soil erosion and sediment delivery; however, Stillwater (2015) reports fully vegetated land cover and streambanks throughout National Forest Lands in the Clear Creek watershed. In conclusion, legacy harvest units on Forest Service lands are unlikely to be causing significant sediment delivery to streams in the action area.

Timber harvest occurs on IDL, Idaho Forest Group, and private lands. The IDL tracks timber harvest on its own land as well as offering forestry assistance to private land holders in Idaho including those in the Clear Creek watershed. Timber sales from non-Federal lands in Idaho must adhere to the specifications in the Idaho Forest Practices Act (IFPA). Past and ongoing timber harvest on these lands in the action area include:

- The Bruin Strom timber harvest was completed in 2013 on 160 acres of IDL endowment land bordering the NPCNF boundary in the LCC Face prescription watershed. There has been no other IDL timber activity in over 20 years in the Clear Creek watershed (Ben Baldwin, pers. comm., IDL, November 16, 2022).

- In the Maggie Creek Supervisory Area, which encompasses Clear Creek, IDL implemented the timber harvest and road management measures of the proposed Idaho Forestry Program (IDL 2009) from approximately 2004 to 2014, on IDL timberlands. In comparison to the IFPA, these measures provided additional leave trees in streamside buffers and additional road maintenance to reduce sediment delivery to streams.
- Effective March 31, 2022, IDL revised timber harvesting rules under the IFPA that will reduce soil damage from ground-based harvesting equipment on steep slopes (<https://www.idl.idaho.gov>).
- The Idaho Forest Group owns about 100 acres in the Clear Creek watershed with no operations in the last 5 years (M. Reggear, pers. comm., IFG, November 18, 2022).
- Harvest on private land is considered light at the watershed scale.

Effects from forestry actions may include noise exposure; water withdrawals; chemical contamination; suspended and deposited sediment; streamflow alteration (ECA); and stream temperature. Road maintenance and use on approximately 45 miles of paved, gravel, and native surface roads will also add suspended and deposited sediment, reduce riparian vegetation along some road sections, and contribute MgCl₂ and petroleum products to road surfaces and eventually to streams.

In summary, heavy timber harvest on Forest land in the upper Clear Creek watershed is at least 22 years old with canopy, ground cover, and root strength essentially fully recovered. These three factors are unlikely to be exacerbating ROS events, soil erosion, or landslide risk that can lead to sediment delivery to streams. Harvest on all other lands is light and unlikely to have significant consequences for the same three factors in the watershed.

Grazing. There are two grazing allotments on NPCNF lands in Clear Creek. A total of 175 cow/calf pairs graze from June 1st to October 30th. As noted in the BA, the majority of grazing on NPCNF land occurs along roads near the headwaters due to the mountainous terrain in the drainage. Cattle water almost exclusively at culvert crossings near the roads. While excess grazing can significantly degrade riparian habitat, current grazing impact on NPCNF land is considered light and not a threat to riparian habitat. Nutrient addition from grazing cattle is not considered a significant source of water contamination on NPCNF land.

Angling. Evaluation of recreational related disturbance of habitat is rated “none” to “low” on NPCNF land, primarily due to poor access, dense bank vegetation, and lack of salmonid habitat in certain reaches. There does not appear to be substantial angling pressure in the action area. The area is not open for sport angling of adult salmon and steelhead. Tribal subsistence fishing, primarily for adult Chinook salmon, does occur at the mouth of Clear Creek; however, this fishery likely has little impact on the earlier migrating adult steelhead. Angling of juvenile steelhead may occur; however, angling in this area appears to be limited, based on limited use of trails and access points along the stream.

Hatchery. The Kooskia National Hatchery, owned by the USFWS and operated by the Nez Perce Tribe, is located near the confluence of Clear Creek and the Middle Fork Clearwater River. Returning adult spring Chinook salmon are captured with a weir on Clear Creek and used as hatchery stock. Some migrating adult steelhead are also captured; however, they are passed through the weir so they may spawn in the Clear Creek watershed. Because the hatchery draws surface water from Clear Creek, the hatchery faces challenges with water quality relating to sediment in Clear Creek, as well as seasonal high temperatures.

Lower Clear Creek. LCC begins a short distance below the NFS boundary to the mouth of Clear Creek but includes Forest land in the Big Cedar and LCC Face subwatershed. LCC is generally bordered by private land where development, timber harvest, agriculture, and grazing occur. The lower stretch of the Clear Creek Road parallels Clear Creek, which flows through residential land and adjacent to some IDL property. Riprap and levees protecting the roads and private lands restricts natural stream meandering, causes channelized flow, and reduces riparian vegetation. Levees on private land also block floodplain connectivity and cause channelized flow, thereby increasing flow velocity and substrate scouring which creates a streambed dominated by cobble and boulders. Streamside road and levees on private land also reduce or eliminate available riparian and/or undercut bank cover and result in a lack of shade and pools, which reduces overall thermal refugia in LCC. Additionally, residential, agricultural, and stock uses have likely resulted in reduced riparian vegetation, unstable stream banks, increased erosion and sedimentation, and reduced streamside cover. Evaluation of water contaminants from LCC was not available on IDL or private land, but some level of water contamination is likely, considering potential inputs of contaminants from road runoff, domestic use, cattle, and other agricultural practices. Loss of riparian vegetation, stream channel and substrate alterations, and loss of connectivity to floodplain due to land uses greatly reduces the functionality of LCC as spawning and rearing habitat for steelhead.

2.4.3 Sediment

Excess sediment can suffocate redds, block upward passage of fry, and reduce the supply of both food and aquatic cover for rearing salmonids (Kondolf, 2000; Suttle et al., 2004). Roads in sensitive habitat can contribute large amounts of sediment to streams with surface runoff during high moisture events or with dust from high traffic areas.

In preparation for the CCIR project, the NPCNF and Clearwater Basin Collaborative commissioned the consultant Stillwater Sciences to perform a comprehensive baseline study of aquatic habitat and fish populations in the Clear Creek watershed (Figure 6). The study was performed in the summer of 2015. In December of 2015, the final report, *Clear Creek Aquatic Habitat Condition Assessment and Fish Population Monitoring* (Stillwater 2015) was completed.

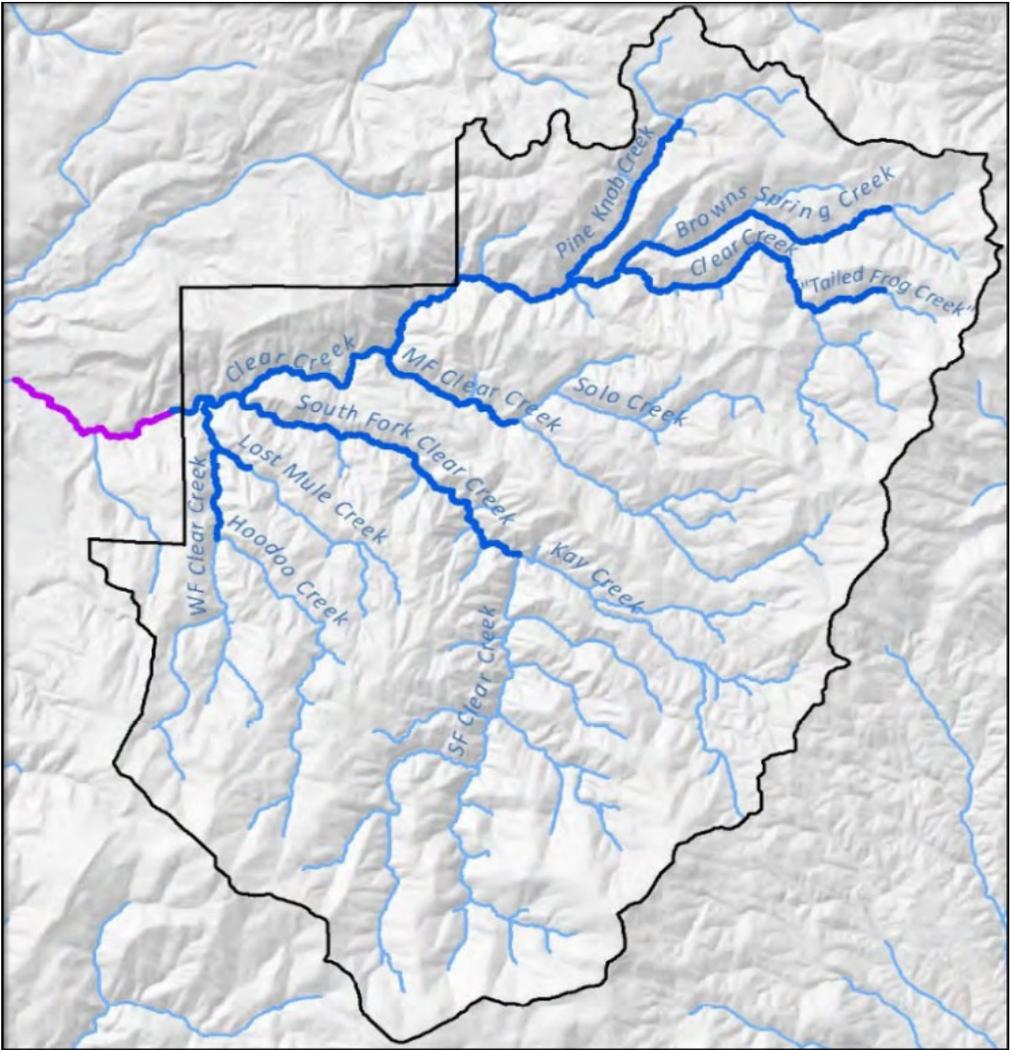


Figure 6. Extent (dark blue and purple lines) of the Stillwater Sciences’ 2015 baseline aquatic habitat and fish population survey in the Clear Creek watershed.

Stillwater Sciences (2015) surveyed Forest “high priority” streams on NFS lands and LCC reaches on State and private land. Stream surveys included 78 transects in 52 stream reaches covering 27 stream miles in eight subwatersheds. The survey did not include all accessible streams in the watershed (Figure 6). However, the overall character of fish-bearing streams (generally 3rd to 5th order) in the watershed can be summarized. Juvenile steelhead were widely distributed in the watershed below natural barriers and there are no man-made barriers. Channels are single thread (97 percent) with some multiple channel areas (3 percent) and confined by hillslopes. Access to these limited floodplains is unrestricted. By stream length, 41 percent of channels were 1 to 4 percent gradient, 47 percent were 4 to 8 percent gradient, and 11 percent were over 8 percent gradient. These statistics indicate that the majority of steelhead accessible streams in the Clear Creek watershed are narrow channels with gradients suitable for steelhead spawning and rearing.

Roads. The Nez Perce-Clearwater National Forests Plan (Forest Plan; National Forest System Land Management Planning Rule 36 CFR Part 219) allows timber management activities to occur in

sediment-limited watersheds, concurrent with improvement efforts, as long as a positive upward trend in habitat carrying capacity is indicated (Gerhardt et al. 1991). The Forest Plan requires that a watershed will move toward the Forest Plan objective over time. In the Clear Creek watershed, an upward trend was deemed likely by the NPCNF due to recent and ongoing road decommissioning. From 2011 to 2016, under other road decommissioning actions, the NPCNF completed the decommissioning of 32.4 miles of system roads and 36.6 miles of non-system roads, removed 53 culverts, and replaced 24 culverts. Under these same actions, the Forest will complete further decommissioning of 3.7 miles of system roads and 96.3 miles of non-system roads, and will remove or replace 20 more culverts. These actions have already undergone consultation. There are currently approximately 200 miles of roads within NPCNF land in Clear Creek, averaging a density of 3.28 miles per square miles (mi/mi^2). There are 239 stream crossings on NPCNF land associated with road use, 23 of which are over fish bearing streams. Eight of the 23 crossings are paved bridges over fish bearing streams in LCC. Many larger roads and trails have cross drain culverts installed upslope of the stream crossings to minimize risk for transportation of sediment, and oils, fuels, salts, and other chemical contaminants directly into streams. Fuel/chemical leaching from roadways at stream crossings, is not considered a significant source of water contamination on NPCNF land.

Elliot et al. (2018) used the Water Erosion Prediction Project (WEPP) model to predict baseline sediment delivery from the 186-mile road network within the NFS boundary in the Clear Creek watershed. Baseline sediment delivery from the road network to streams is predicted to be 4.5 tons per square mile (tons/mi^2) for the action area of 68 square miles. Sediment production from undisturbed granitic watersheds in Idaho, similar to Clear Creek, are reported to be 23 to 26 tons/mi^2 (Sugden 2018; Elliot 2013; Megahan and Kidd 1972) with a delivery ratio of 0.3 (Elliot and Miller 2017). Applying the sediment delivery ratio to the rates above, the delivery rate from an undisturbed watershed is about 7 tons/mi^2 . When compared to the baseline delivery rate of 4.5 tons/mi^2 , the existing road network is adding approximately 64 percent more sediment to the watershed annually. Due to the high variability of soil erodibility, at best there is a 90 percent likelihood that the erosion and delivery predictions are within plus or minus 50 percent of the actual amounts (Elliot et al. 2018).

Watershed road density is considered a rough estimate of relative effects from roads to streams in a watershed, NMFS and NPCNF guidelines (NMFS 1996) suggest watershed scale road density for high habitat conditions is less than 1 mi/mi^2 , moderate 1 to 2 mi/mi^2 , and greater than 3 mi/mi^2 representing low conditions (NMFS 1996). The baseline road density in the Clear Creek watershed is 2.9 mi/mi^2 , with no subwatersheds in the high function category, four in moderate, and six in the low category. Maximums and minimums in the range include, Pine Knob, Browns Springs and Cedar Creek subwatersheds are over 4 mi/mi^2 with the South Fork the lowest at 1.6 mi/mi^2 . Considering road density within RHCAs, the Middle Fork Clear Creek is primarily a roadless area and has the only high functioning RHCA road density, whereas Big Cedar Creek has an unusually high 12.3 mi/mi^2 RHCA road density due its stream-adjacent roads. Roads on landslide prone areas within the Clear Creek watershed are in low density 0.1 mi/mi^2 (considered high functioning by NMFS criteria) and present only a small additional risk to landslide initiation and sediment delivery from roads.

Cobble Embeddedness. The level of substrate CE is important both for spawning and rearing of salmonids and for production of aquatic invertebrates (Rowe et al. 2003a). High embeddedness can

be caused by the underlying geology of the watershed, or by fine sediment inputs due to land management activities (e.g., road building) or natural disturbance (e.g., landslides). The Stillwater (2015) survey revealed that CE showed little variation at the variable stream reach scale when compared to the habitat unit scale (pools, riffles, etc.). Individual reaches (range 1 to 50 percent) averaged at the subwatershed scale had embeddedness of 30 to 36 percent. Reach scale lower CEs of less than 30 percent were not common and were distributed throughout the watershed except the South Fork Clear Creek. In 2019, the NPCNF measured CE in Pine Knob Creek, Brown Springs Creek, and Hoodoo/West Fork of Clear Creek and found to be 25 to 37 percent, similar in range to the Stillwater (2015) findings. LCC through private lands showed less embeddedness, averaging 1 to 10 percent with a maximum of 30 percent for reaches and 20 percent overall (Stillwater 2015). Embeddedness for the northern and middle Rockies ecoregion in Idaho has been reported to average 12 percent (Grafe 2002), indicating that embeddedness in the study area was higher than other streams evaluated in the same ecoregion in Idaho. Previous studies have identified high embeddedness as a potential problem in the Clear Creek watershed (Elliot et al. 2018) likely caused in part by the existing road system (Elliot et al. 2018).

Sand and fines (silt and clay) can embed larger particles, reducing the quality of spawning gravels and conditions for incubation, as well as conditions for benthic macroinvertebrate production. In the Guide to Selection of Sediment Targets for Use in Idaho TMDLs (Rowe et al. 2003a), reference conditions for surface or percent fines in granitic B and C channels (steelhead spawning) were 23 and 34 percent. Rowe et al. (2003a) recommended upper levels for B and C channels for granitic geology (37 percent), volcanic (27 percent), the geologies found in Clear Creek. The area of bed substrates classified as sand and fines (percent fines) in all Clear Creek subwatersheds ranged from 12 to 24 percent. This range of percent surface fines is considered a high to moderate functioning habitat condition according the threshold levels developed for the Nez Perce-Clearwater National Forest (NMFS 1996).

Spawning Gravel. Stillwater (2015) rated spawning gravel as good or fair throughout the Clear Creek watershed. Spawning gravel is distributed across gradients and subwatersheds with the larger LCC area and upper Clear Creek having the greatest spawning area per unit length. Spawning gravel is not considered to be a limiting factor in the Clear Creek watershed.

Large wood is a critical stream habitat component in forested watersheds such as Clear Creek. Large wood promotes scour and pool formation, provides instream cover and habitat complexity elements, and sorts, stores, and regulates sediment in streams. In a study of natural conditions, Overton et al. (1995) describes good stream habitat conditions for Idaho forests as including greater than 20 pieces of large woody debris (LWD) per mile (greater than 12 inches diameter and greater than 35 feet length). Although the Stillwater (2015) survey found abundant wood in streams smaller than this criterion, the Upper Mainstem Clear Creek subwatershed is the only subwatershed meeting this condition with 27 pieces per mile; all other subwatersheds averaged less than 1 to 11 pieces per mile. This quantity of LWD indicates that streams in the Clear Creek watershed are well below natural conditions.

Deep pools. The quality and quantity of salmonid habitat is often discussed in terms of pool prevalence (Montgomery et al. 1995). Pools provide important habitat for different life stages and species of salmonids and are used for holding, spawning (in pool tail outs), rearing, and high-flow

refugia. The USFS interim riparian management objectives (RMOs) (Quigley et al. 1997) call for 96 pools per mile in streams 10 feet in wetted-width, and 56 pools per mile in streams 20 feet in wetted-width. Based on these thresholds, the number of pools per mile is well below the USFS RMO thresholds in all subwatersheds. Pool frequency and quality within the Forest boundary can also be affected by upstream management activities. The generally low incidence of deep pools may be the result of low wood loading and high sediment supply. Below the Forest boundary, pools are affected by channelization and disconnection from the floodplain.

2.4.4 Water Temperature

Water temperature can be a major driver of the seasonal migrations and thus distributions of cold-water species, with individual fish moving within a watershed to reaches with more thermally optimal temperatures (behavioral thermoregulation) (Behnke 1992, Sauter et al. 2001, Grafe 2002).

Canopy cover, measured as an indicator of stream shade, is important in moderating water temperature and is heavily influenced by past disturbances such as fire and management actions. Mean canopy cover on NFS land ranged from 58 percent to 93 percent, with little canopy in LCC likely partially due to grazing and private development (Stillwater 2015). Mean canopy cover for the northern and middle Rockies ecoregion in Idaho was reported to be 48 percent (Grafe 2002) indicating higher than average canopy cover in Clear Creek when compared with other streams in the ecoregion.

The Environmental Protection Agency finds the optimal stream temperature for salmon and steelhead rearing to be 57.2°F to 66.2°F (USEPA 2003¹). Richter and Kolmes' 2006 literature review suggests the following 7-day average maximum daily temperature limits for steelhead:

- 55.4°F for spawning and incubation;
- 60.8°F for rearing and growth (reduced growth after 66.2°F; no growth at 72.5°F);
- 64.4°F for adult migration (blockage occurs around 69.8°F);
- At approximately 71.6°F to 75.2°F, temperature becomes a significant mortality factor in both juvenile and adult steelhead.

The most current available water temperatures for Clear Creek tributaries are included in the Integrated Restoration Project FSEIS Aquatics Report (NPCNF 2021). Stream temperatures were monitored at 11 stations throughout Clear Creek and its tributaries between 1991 and 2016. The year and number of times monitored varied by stream. Streams on Forest Service managed lands stayed between 57.2°F and 66.2°F maximum temperatures for all sites in all measured years except Clear Creek at the Forest boundary in 2015 which reached 68°F. Data was retrieved from a new stream gage at the Forest boundary (USGS 13337095, period of record November 4, 2021 to October 26, 2022). The data show that, in general, in the summer of 2022, the 7-day maximum

¹ EPA (2003) EPA Region 10 Guidance For Pacific Northwest State and Tribal Temperature Water Quality Standards can be found online at <https://www.epa.gov/wa/northwest-water-quality-temperature-guidance-salmon-steelhead-and-bull-trout>, last updated January 20, 2022.

daily temperature criteria of 66.2 for rearing steelhead was exceeded over 30 times from about mid-July to September and had a maximum of 70.6°F. This would indicate impediment of maximum growth rates for rearing steelhead. Except for the data from the summers of 2015 and 2022, maximums at the Forest boundary, all streams measured had maximum stream temperatures that were within the optimal range for steelhead juvenile rearing using the criteria above.

Summer water temperatures in lower Clear Creek may be unsuitable for juvenile steelhead rearing. Average daily maximum water temperatures (average for each day over the date range) were retrieved from the online USGS stream gage near the mouth of Clear Creek (USGS No. 13337099, available date range October 2016 through September 2022). Seven-day average maximum temperatures can be characterized as above optimum for rearing from June 23 through September 10, and had seven 7-day average maximums where water temperatures indicate no growth or lethal consequences for juvenile steelhead. In conclusion, lower Clear Creek in summer is unlikely to support optimum growth temperatures, and rearing juvenile steelhead are very likely to be migrating upstream or downstream to find more optimal water temperatures.

It is likely that steelhead adults use LCC as a spawning area and migration corridor during spring, and juveniles use it as a migration corridor in summer to reach cooler upstream water. As adult steelhead typically migrate up tributaries in late winter and early spring when air temperatures and snowpack runoff keep stream temperatures cool, it is unlikely the temperatures at the mouth of Clear Creek pose a migration barrier to adult steelhead. Steelhead smolts typically begin migrating to the ocean from natal streams in the spring, overlapping adult spawning. It is unlikely that the temperatures in LCC prohibit smolt migration.

As climate change continues to affect snowpack and ambient air temperatures in the watershed, water temperatures will likely increase. However, because water temperatures will not rise above optimal ranges until after peak flows in early summer, water temperatures during spring spawning and outmigration will likely continue to remain in optimal ranges. Low stream volume associated with reduced snowpack runoff in late summer and fall will reduce resistance to warming air temperatures (Mote 2003; Luce and Holden 2009; Clark 2010). While temperature is not likely hindering steelhead in Clear Creek currently, climate change is predicted to increase summer water temperatures. This summer increase will decrease suitable summer rearing habitat in LCC.

In conclusion, current water temperatures on NFS land in upper Clear Creek are in optimal ranges for steelhead spawning and summer rearing. Downstream of the NFS boundary, where there are large amounts of spawning and rearing habitat, summer water temperatures are well above optimal, and at times nearing maximum survivable, temperatures for steelhead rearing. Climate change is predicted to cause increases in summer water temperatures which will reduce steelhead rearing habitat in the lower reaches.

2.4.5 Steelhead Distribution

There are 28 full or partial barriers to anadromous fish in the upper watershed. Only five were considered total barriers and were located in relatively small streams in the upper portions of the watersheds. Others had *O. mykiss* above the potential barriers (Stillwater 2015).

The report describes steelhead spawning and rearing habitat, and juvenile steelhead, are widely distributed throughout the Clear Creek watershed (Stillwater 2015). Within the National Forest, juvenile *O. mykiss* were observed in the mainstem and all major tributaries surveyed. In mainstem Clear Creek, they were observed from the National Forest boundary upstream to above the confluence of Browns Spring Creek where juvenile densities then dropped considerably. *O. mykiss* were observed part way up Browns Springs Creek. In West Fork Clear Creek, *O. mykiss* were documented from the confluence, upstream to the end of the study area; however, they were not documented in Lost Mule Creek, a small tributary to the West Fork. Likewise, in South Fork Clear Creek, Middle Fork Clear Creek, and Pine Knob Creek, *O. mykiss* were documented in all reaches surveyed. In the summer of 2019, the Idaho Department of Fish and Game conducted a juvenile steelhead survey throughout upper Clear Creek (Poole et al. 2019). The survey did not show steelhead extent, or densities (range 0 to 25 per 100m²), beyond the extent or densities (range 0 to 44 per 100m²) reported in Stillwater (2015).

2.4.6 Baseline Summary

The action area is the Clear Creek watershed and is one of six major spawning areas for the Lower Mainstem Clearwater River population with occupied designated critical habitat throughout. Steelhead spawning likely occurs throughout the Clear Creek watershed. Juvenile rearing is concentrated in the middle and upper watershed, and limited in the lower watershed below the Forest boundary in summer by suboptimal warm water temperatures.

Fine sediment in substrates is higher than for undisturbed watersheds in the ecoregion and represent impaired conditions for steelhead spawning and rearing. Heavy timber harvest on Forest land in the upper Clear Creek watershed is at least 22 years old with canopy, ground cover, and root strength essentially fully recovered; and unlikely to be exacerbating ROS events, soil erosion, or landslide risk that can lead to sediment delivery to streams. Harvest on all other lands is light and unlikely to have significant consequences for the same three factors in the watershed. Chronically elevated fine sediments in Forest streams are likely due to the existing road system which was modeled to be contributing 64 percent more sediment than for undisturbed conditions. Non-paved roads on non-Forest lands are likely also acting as chronic sediment delivery sources to streams in the Clear Creek watershed. Large wood and pools are below PACFISH RMOs and may be smaller contributors to, or a sign of, excess sedimentation in substrates.

2.5 Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

The BA provides an analysis of the effects of the Clear Creek Integrated Restoration Project on SRB steelhead and their critical habitat. NMFS used information in the BA, BA modifications, BA errata, and updated information from March through May, 2022, provided by NPCNF for the

effect's analysis. In addition, NMFS used the best available data and information from databases, government reports, and scientific literature to discuss and evaluate the potential effects of the proposed action on SRB steelhead and the physical or biological features of their critical habitat as described in the following sections.

2.5.1 Effects on ESA-listed Species

The proposed action will be implemented over a period of 20 years, with activities being conducted as conditions allow (e.g., timber harvest could occur year-round, road work will typically occur from April through November, and prescribed fire will typically occur in the spring and fall). All life stages (i.e., incubating eggs, alevins, fry, juveniles, and adults) of steelhead are expected to be present in streams within the Upper Clear Creek, LCC, and South Fork Clear Creek subwatersheds. Steelhead typically spawn from March to June, and fry emerge by mid-July.

The proposed action has the potential to affect SRB steelhead both directly and indirectly due to the following: (1) Construction noise exposure; (2) water withdrawals; (3) chemical contamination; (4) suspended sediment and dewatering from culvert replacements (5) deposited sediment; (6) streamflow alteration (ECA); and (7) increased stream temperature. These potential effects are described in more detail below.

2.5.1.1 Construction Noise

Heavy equipment that will be used for implementing the proposed action (e.g., excavator, grader, dump truck, log-haul truck, etc.) operating near streams will create continuous point source noise and vibration. Noise produced from these types of heavy equipment, at 50 feet from the source, range from 68 and 90 dB 20 μ Pa (decibels are referenced for air at 20 μ Pa [micropascal] and for water at 1 μ Pa) (FHA 2008; USNRC 2012). Noise from a point source spreads spherically, attenuating at a standard rate of 6 dB and 7.5 dB 20 μ Pa per doubling of distance in air and unpacked earth respectively (USNRC 2012). The impedance of water is 3600 times that of air, and sound not reflected from the water's surface will propagate from air to water with a reduction of approximately 36 dB 20 μ Pa. Vibration through soil or rock will attenuate at 6.0 dB to 8.4 dB 20 μ Pa per doubling of distance before creating sound pressure waves in the water at the soil water interface (Caltrans 2020). Sound pressure in water will attenuate at 4.5 dB 1 μ Pa per doubling of distance (Caltrans 2020). Sound is further attenuated in streams by rocks, boulders, and currents, and streams have very high background noise levels (USNRC 2012). The extent of machinery noise in streams is assessed using the line-of-site rule where noise will propagate into any area in a straight line from the source and will not propagate around stream bends (USNRC 2012). Using this rule, machinery noise will not propagate in water, upstream or downstream, beyond the first bend in the stream. With this reflection and attenuation of noise in air, ground, and water propagation pathways, and limited propagation range in streams, machinery noise, if distinguishable from in-stream background noise, will not cause adverse effects to steelhead but may cause steelhead to temporarily move short distances to avoid the disturbance.

2.5.1.2 *Water Withdrawals*

Water will be withdrawn from streams for prescribed fire safety, dust abatement, and temporarily pumping/diverting water out of stream channel sections for culvert removal or replacement. The pumping for culvert replacements would occur at the three-culvert-replacement sites that will be monitored for turbidity. Although steelhead have not been observed at these three sites, BMPs, such as following NMFS' (2022b) and maintaining passage, will be employed to reduce adverse impacts to any fish species. Withdrawing water from streams can impact fish through entrainment in intake hoses, by impingement on fish screens, and by reducing water quality and quantity.

Streamflows are a critical part of fish habitat and viability. Reducing streamflow can adversely affect the amount and quality of accessible habitat, reduce food availability and foraging opportunities, and adversely affect water quality. This, in turn, can affect the growth, survival, and productivity of steelhead. Reducing flow could eliminate access of juvenile salmonids to important habitat types such as undercut banks and tributary streams (Brusven et al. 1986; Raleigh et al. 1986). Similarly, reducing the volume of water in streams would reduce the quantity and quality of prey and limit foraging opportunities and foraging efficiency of salmonids (Boulton 2003; Davidson et al. 2010; Harvey et al. 2006; Nislow et al. 2004; Stanley et al. 1994). In addition to adverse impacts to habitat and forage, reductions in streamflow can adversely impact water quality by increasing summer water temperatures (Arismendi et al. 2012; Rothwell and Moulton 2001).

The equipment used to remove water from a stream or pond will meet NMFS' screening criteria, as determined by an NPCNF fisheries biologist. NMFS criteria require an intake hose be fitted with screens having a 3/32-inch mesh size and the appropriate surface area such that water velocities at the screen do not exceed 0.4 feet per second. Using NMFS screening criteria, fish are unlikely to be adversely affected by the use of intake hoses. In addition, stream flow and surface elevation will not be reduced by more than 10 percent while pumping.

As noted above, there are also potential effects from removing all or a portion of the water in the stream. The water withdrawals from streams for dust abatement and fire suppression are expected to be infrequent and remove only a small portion (i.e., enough to fill a water truck) of the total volume of water at any given time. The NPCNF estimates that it typically takes less than 2 hours of pumping to fill the tank of a water truck used for these activities. A fish biologist or hydrologist will designate the locations for water withdrawals to maintain continuous streamflow through the pumping location. In addition to the infrequent and carefully sited characteristics of the activities, the NPCNF also proposes limiting pumping to no more than 10 percent of the streamflow. Because the flow reductions will be small, infrequent, temporary (i.e., water will not be continually withdrawn), and limited in volume compared to streamflow, juvenile steelhead will not be harmed by water withdrawal in the action area.

2.5.1.3 *Chemical Contamination*

The high volume of road work, timber harvest, and haul, over the extended period of time of this action, increases the risk of chemical contamination of streams in the action area. Fuel will be stored near construction, logging, and pumping equipment and away from streams. The high volume of log-haul traffic increases the risk of accidental spills of fuel, lubricants, hydraulic fluid, and similar contaminants on roadways in RHCA's or directly into the water. If haul trucks

chronically leak fuels, etc. onto the roadway, the large number of haul trips on many of the roads could create new chronic inputs of toxic chemicals into streams.

Petroleum-based products (e.g., fuel, oil, and some hydraulic fluids) contain polycyclic aromatic hydrocarbons, which can cause lethal or chronic sublethal effects to aquatic organisms (Neff 1985). These products are moderately to highly toxic to salmonids, depending on concentrations and exposure time. Free oil and emulsions can adhere to gills and interfere with respiration, and heavy concentrations of oil can suffocate fish. Evaporation, sedimentation, microbial degradation, and hydrology act to determine the fate of fuels entering fresh water (Saha and Konar 1986). Ethylene glycol (the primary ingredient in antifreeze) has been shown to result in sublethal effects to rainbow trout at concentrations of 20,400 milligrams per liter (mg/L) (Staples et al. 2001). Brake fluid is also a mixture of glycols and glycol ethers, and has about the same toxicity as antifreeze.

The risk of fuel spills from fuel storage and transfer will be minimized with proposed BMPs. The NPCNF will require spill prevention and containment materials onsite during in water work to minimize adverse effects to aquatic biota if a spill were to occur. It is standard practice for loggers to refuel all equipment using 40- to 75-gallon slip tanks stored in the back of pickup trucks. Chainsaws are refueled from 5-gallon containers that may be taken into the field. Logging trucks will refuel in town, outside the action area. All on-site fuel storage, fuel transfer, and machinery servicing is governed by the provisions of the sanitation and servicing portion of the timber contract. The timber contract provisions include, for instance, that contractors will maintain all equipment in good repair and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid. Also, for stationary equipment such as yarders and loaders, contractors will be required to have spill prevention and containment materials available on site. For any oil product storage exceeding 1,320 gallons, the contractor is subject to the rules and provisions of Federal Regulation 40 CFR 112 and must submit to the NPCNF a Spill Prevention, Control, and Countermeasure Plan.

Although storage of fuel for water pumping is allowed in RHCAs, fuel storage container size is limited to 5 gallons with a maximum of 10 gallons total storage between all containers, and spill containment will be available on site. In practice, these storage cans are stored in trucks or are placed on top of absorbent pads.

For culvert or in-channel work, the NPCNF will require that all mechanical equipment be inspected daily and maintained to ensure there are no leaks. Contractors will have spill prevention and containment materials available on site when working in riparian areas or instream to minimize the impact of spills reaching a stream. High volume haul routes could accumulate contaminants from haul trucks. However, as mentioned above, equipment must not have abnormal leakage; therefore, toxic buildup on roads is not anticipated. In addition, cross drain placement will minimize the length of roadway from which toxic chemicals can be delivered to streams.

The greatest risk of fuel entering streams would be if an accident were to occur at a stream crossing or fuel spilled into a roadside ditch that flowed directly into a perennial stream. If a fuel spill were to occur into a stream, all spawning, rearing, and incubating life stages of fish that are present could be killed or harmed depending on the dilution from a given size of water body. The extent of this effect would vary greatly, depending on the quantity of the spill, and the size and location of the receiving waterbody. There are 239 stream crossings with 23 over fish-bearing streams. Eight of the

23 crossings are paved bridges over fish bearing streams in LCC. There are 216 crossings over non-fish-bearing streams because most of the haul routes are near ridgetops upstream of fish-bearing streams and larger collector routes are near the high elevation boundary of the Clear Creek watershed. In addition, there are 10.4 miles of roads adjacent to streams. Of these 10.4 miles, 2.3 miles drain to fish-bearing streams at crossings. To calculate the amount of road length draining to streams, NMFS used the number of stream crossings and miles of stream-adjacent roads draining to streams. Assuming a 100-foot road length draining from each side of any crossing, there are 43,200 feet (8.2 miles) of road draining to 216 crossings over non-fish-bearing streams. There are 2.3 miles of road draining to streams from 23 crossings and adjacent roads to fish-bearing streams. In summary, there are 156.9 miles of haul routes (Elliot and Miller 2018) with 5.2 percent of the haul road network draining to non-fish bearing streams at crossings, and only 1.4 percent draining to fish-bearing streams. Any road segments not draining to stream crossings, and functioning properly, do not route water to streams at stream crossings.

With implementation of standard BMPs including practices such as low speed limits and dust abatement, which improves visibility, there has been a low rate of accidental spills on the NPCNF. The NPCNF reports only one accidental spill during haul of 560 MMBF over many projects in the years 1999 to 2014 and this one spill did not reach a stream. Given this rate of accidents, there is a 0.18 percent chance of a spill for every one MMBF of logs hauled. With a proposed haul of 48 MMBF, there is an approximate 9 percent chance of an accidental spill occurring from haul. With 6 percent of the haul road network draining to streams and 1.4 percent draining to fish-bearing streams, there is a 0.5 percent chance of a spill reaching a stream and an extremely small chance of a spill reaching a fish-bearing stream for the duration of the project.

The NPCNF may use $MgCl_2$ for dust abatement on major timber haul routes. The $MgCl_2$ can be carried by road runoff into ditches and streams during a rain event. Chloride concentrations as low as 40 parts per million have been found to be toxic to trout, and concentrations up to 10,000 mg/L have been found to be toxic to other fish species (Foley et al. 1996 and Golden 1991 in Piechota et al. 2004). Salt concentrations greater than 1,800 mg/L have been found to kill daphnia and crustaceans, and 920 mg/L of calcium chloride has been found to be toxic to daphnia (Sanders and Addo, 1993, in Piechota et al. 2004). The $MgCl_2$ for dust abatement can also affect roadside vegetation. In a study in Colorado, (Goodrich et al. 2008), some severely damaged vegetation occurred along most roads regardless of maintenance or $MgCl_2$ treatment procedures; however, a higher occurrence of severe damage was observed on many roadside species along roads treated with $MgCl_2$. The study also linked vegetation effects or lack thereof to the sloped position from the road to the vegetation. More vegetation damage occurred where road slope directed runoff containing the abatement chemical.

The exposure of ESA-listed fish to $MgCl_2$ will be kept to a low level with BMPs and specifications found in the Standard Contract for all timber sales. For example, one BMP requires a 1-foot no-spray buffer be left on the edges of the road, if road width allows, to minimize overspray into ditches. The Standard Contract specifies preparation of the road surface prior to application, the rate of application, and that water be applied after the $MgCl_2$. This BMP and three contract specifications are designed to maximize penetration of chemical into road surface, minimize the amount of $MgCl_2$ used, and to minimize the amount of chemical running off the road surface. Those measures, the road reconstruction upgrades to reduce the hydrologic connection of road surfaces to

streams, and the position of primary haul routes upstream of fish-bearing waters will avoid or minimize introduction of $MgCl_2$ being introduced into streams, ensuring concentrations would be very low at most, and would be unlikely to cause harm to steelhead.

Herbicide use is not proposed for this project. The spread of noxious weeds will be controlled through preventative BMPs specifying the cleaning of equipment before arriving on site and replanting bare soil areas, such as landings with weed-free seed. Given these BMPs, the risk noxious weeds spreading in the action area is low and unlikely to cause adverse effects steelhead.

2.5.1.4 Suspended sediment and dewatering from culvert replacements

All culvert replacements or removals will be done in low water periods and have work areas dewatered then rewatered if water is present. Dewatering and rewatering will cause turbidity with the potential to affect steelhead. Concentration of suspended sediment in the water column is often measured as turbidity (i.e., scattering of light due to suspended sediment in the water column) in NTUs. The NTUs are often used as an alternative to turbidity measurements expressed in milligrams of sediment per liter of water (mg/L) because readings can be taken instantaneously on-site and, for any project, actions can be altered if readings approach thresholds harmful to fish. The most critical aspects of a suspended sediment (turbidity) effects analysis are timing, duration, intensity and frequency of exposure (Bash et al. 2001).

Suspended sediment can affect fish through a variety of direct pathways: abrasion (Servizi and Martens 1992), gill trauma (Bash et al. 2001), behavioral effects such as gill flaring, coughing, and avoidance (Berg and Northcote 1985; Bisson and Bilby 1982; Servizi and Martens 1992; Sigler et al. 1984), interference with olfaction and chemosensory ability (Wenger and McCormick 2013), and changes in plasma glucose levels (Servizi and Martens 1987). These effects of suspended sediment on salmonids generally decrease with sediment particle size and increase with particle concentration and duration of exposure (Bisson and Bilby 1982; Gregory and Northcote 1993; Servizi and Martens 1987, Newcombe and Jensen 1996). The severity of sediment effects is also affected by physical factors such as particle hardness and shape, water velocity, and effects on visibility (Bash et al. 2001). Although increased amounts of suspended sediment cause numerous adverse effects on fish and their environment, salmonids are relatively tolerant of low to moderate levels of suspended sediment. Gregory and Northcote (1993) and Rowe (2003b) have shown that moderate levels of turbidity (35 to 160 NTU) can accelerate or maintain foraging rates among juvenile Chinook salmon and steelhead, likely because of reduced vulnerability to predators (camouflaging effect; Gregory and Northcote (1993).

Salmon and steelhead tend to avoid suspended sediment above certain concentrations. Avoidance behavior can mitigate adverse effects when fish are capable of moving to an area with lower concentrations of suspended sediment. To avoid turbid areas, salmonids may move laterally (Servizi and Martens 1992) or downstream (McLeay et al. 1987). Avoidance of turbid water may begin as turbidities approach 30 NTU (Sigler et al. 1984; Lloyd 1987). Servizi and Martens (1992) noted a threshold for the onset of avoidance at 37 NTU (300 mg/L total suspended sediment). However, Berg and Northcote (1985) provide evidence that juvenile coho salmon did not avoid moderate turbidity increases when background levels were low, but exhibited significant avoidance when turbidity exceeded a threshold that was relatively high (greater than 70 NTU).

The NPCNF summarized turbidity monitoring data from 20 of their culvert, diversion, and road replacement or removal projects (A. Connor, NPCNF hydrologist, unpublished data 2014). The NPCNF found spikes in turbidity at the onset of dewatering and rewatering, extended between 100 and 600 feet downstream, and less than 2 hours. 50 percent of the spikes exceeded 50 NTU, with a maximum of 250 NTU.

Based on the intensity and duration of turbidity exposure for those projects, and effects thresholds summarized in Newcombe and Jensen 1996, it is likely that juvenile steelhead would have experienced non-lethal physiological harmful effects in the areas below the culvert work sites. Expected temporary (up to 2 hours) effects would have included behavioral effects such as volitional movement and/or reduced or increased feeding, and physiological effects including coughing. Because the proposed culvert replacements will occur on similar sized streams, at a similar time of year, effects to steelhead that may be present are expected to be similar to those indicated by the NPCNF's prior assessment of culvert work and defined by Newcombe and Jensen (1996).

Few steelhead, if any, are expected at the 66 proposed culvert replacement sites and none will be present at the 13 culvert removal sites. However, three culvert replacement sites² were identified as the most likely to have steelhead present because they were closest to designated critical habitat. Only one of these sites is located within critical habitat. Because of the possible presence of steelhead, these three sites will be monitored for turbidity and steelhead presence, and are given the following additional analysis. To isolate a culvert work area, the site is slowly dewatered to allow fish to volitionally move downstream out of the area. During this process, some juvenile fish may be stranded. When the isolated work area is rewatered, loose sediments mobilize and create a turbidity plume downstream. These plumes are not expected to go more than 600 feet downstream, as evidenced by the 20 culvert replacements discussed above. Steelhead within these plumes may experience adverse effects.

Recent surveys, including Stillwater (2015), indicate that steelhead presence is greater than 600 feet downstream at the three sites. However, these three sites are closer to occupied habitat than the other 63 stream crossing replacements and there is the possibility of steelhead distribution expanding to within 600 feet of these three sites during the project timeframe. Two of the three sites are in upper Clear Creek where the farthest upstream juvenile steelhead densities found were 0.0215 steelhead per 100 square feet (ft²) of stream (Stillwater Sciences 2015). The remaining site is high in the South Fork Clear Creek within 600 feet of critical habitat but about 5 miles above known steelhead presence (density 0.0269 per 100 ft²) with no passage barriers (Stillwater Sciences 2015). The average fish density for the two general locations is 0.0242 per 100 ft² of stream. Because steelhead are presently unlikely to be at the three sites, fish salvage was not proposed. Without fish salvage, and if steelhead are present at the time of implementation, dewatering the stream channel and consequent turbidity may have adverse effects to steelhead.

To account for possible harm or death of these steelhead, NMFS has taken a conservative approach and has calculated the number of steelhead that could be present and affected by dewatering and turbidity plumes at the three sites most likely to have steelhead present. As discussed above, based

² These three sites will be monitored for turbidity and steelhead presence

on 20 similar culvert replacements on NPCNF roads, the resulting turbidity plume is not expected to exceed 600 feet downstream. Assuming an instream effects extent of 600 feet, stream width of 6 feet, and an average steelhead density of 0.0242 per 100 ft² of stream, NMFS estimates 0.9, or one, juvenile steelhead to be present in the affected reach at each of the three sites for a total of three juvenile steelhead. Because steelhead densities are estimates, NMFS doubled the number to six steelhead. NMFS assumes steelhead would be evenly distributed throughout the 600 feet and estimates that up to half the extent of 600 feet at any of the three sites could be dewatered. Thus, NMFS assumes half of the estimated steelhead (three of six) would be killed from stranding during dewatering. (The number of fish stranded could be less than three because the proposed gradual dewatering technique tends to cause some or most fish to escape the reach being dewatered).

The remaining three of the six steelhead would experience physiological effects from the turbidity plumes below the 300 feet of dewatered area. The NPCNF proposes to monitor turbidity within 600 feet of the three dewatered areas and slow work, dewatering, or rewatering if turbidity exceeds 50 NTU. This conservative approach is within the bounds of non-lethal physiological effects as discussed above. In conclusion, and taking a conservative approach, NMFS assumes three juvenile steelhead will die from stranding in dewatered work areas, and adverse effects greater than those analyzed in this opinion would occur to juvenile steelhead if visible turbidity exceeded 600 feet downstream.

Other activities that may generate turbidity in fish-bearing streams include instream monitoring, road reconditioning, reconstruction, and decommissioning, and road use. As discussed above, cross drains presently in place, or added prior to other road work, will minimize the amount of road draining to streams. In addition, sediment BMPs (surface gravelling, revegetation, and sediment filtering structures) should reduce sediment delivery from road surfaces and ditches to streams. With these sediment reduction measures at and near stream crossings, road work and road use are expected to generate significantly less turbidity, per crossing, than from direct streambed disturbance or rewatering of isolated work areas. In general, sediment mobilization from road work areas to streams would occur during spring high water or heavy rain events when stream turbidity is high and added sediment from roads blends with this background turbidity with no adverse effects to steelhead expected during these events. Or, during smaller precipitation events without high stream flow, sediment is delivered from roads to streams but is deposited close to the source without creating turbidity at high enough levels to have adverse effects to steelhead. The following section, Deposited Sediment, discusses the effects of the deposited sediment.

2.5.1.5 Deposited Sediment

Proposed harvest, burning, and road activities disturb soils or road prisms which makes fine sediment more available for transport from hillslopes and road prisms to streams. These proposed activities can deliver sediment through the common pathway of soil disturbance, increased surface erosion and transport during precipitation events, and delivery of fine sediment (less than 2 mm diameter) to action area streams. Once delivered to streams, fine sediments are suspended and transported, then begin to deposit in a graded pattern with larger particles settling out first and smaller particles settling out farther downstream (Foltz 2008), where this excess fine sediment can have cause harm to steelhead.

The Clear Creek watershed has had chronic high sediment levels for the past 30 years from the existing road system, past timber harvest, fire, and local geology. Fine sediment baseline conditions, as measured by CE (average 30 to 36 percent), are impaired (greater than 20 percent; NMFS 1996) for all subwatersheds or NPCNF prescription watersheds in the action area. This deposited sediment analysis starts with an overview of possible effects from excess fine sediment to fish, and then steps through proposed harvest, burning, and road related actions, and their mitigation measures which are designed to minimize short-term impacts from these proposed activities and improve long-term sediment levels in the Clear Creek watershed.

All freshwater steelhead life stages (i.e., adult migration and spawning, and juvenile development from egg to smolt emigration) will be present at various times for the duration of the project. The proposed action has the potential to affect steelhead spawning, incubation, and rearing through increasing sediment deposition in stream substrates.

Project actions will cause soil disturbance which, particularly during precipitation events or during wet periods, may cause sediment to mobilize into streams, become suspended, transported, and deposited into downstream substrates. When suspended sediment settles out of suspension, it can cause detrimental effects on spawning and rearing habitats by filling interstitial spaces between gravel particles (Anderson et al. 1996; Suttle et al. 2004). Sedimentation can: (1) Bury salmonid eggs or smother embryos; (2) destroy, alter or displace prey habitat; and (3) destroy, alter or displace spawning and rearing habitat (Spence et al. 1996). Excessive sedimentation can reduce the flow of water and supply of oxygen to eggs and alevins in redds. This can decrease egg survival, decrease fry emergence rates (Bash et al. 2001; Cederholm and Reid 1987; Chapman 1988), delay development of alevins (Everest et al. 1987), reduce growth and cause premature hatching and emergence (Birtwell 1999), and cause a loss of summer rearing and overwintering cover for juveniles (Bjornn et al. 1977; Griffith and Smith 1993; Hillman et al. 1987). Through the implementation of recent forest management BMPs, (i.e. such as proposed by the NPCNF), there is little potential for sediment delivery to streams from timber harvest and prescribed burning, but there is potential for delivery from road work and road use (Brown et al. 2013) because road generated sediment can enter streams directly at stream crossings. Deposited sediment effects from all potential project sources are analyzed below.

Timber Harvest

The NPCNF proposes 5,854 acres of harvest and 1,784 acres of non-harvested pre-commercial thinning (Table 1). Harvest units will be sold in seven sales over 5 years which will distribute sediment effects over space and time, as well as concentrate downstream effects where sales overlap in subwatersheds. Regeneration and commercial thinning representing the most intensive harvest treatments, and somewhat evenly distributed among the subwatersheds with a notably large 1,174 acres of commercial thinning proposed in the Hoodoo Creek subwatershed for the 2025 Corral Creek sale.

Sediment modeling

Each sediment model below accounts for timber harvest, NEZSED/FISHSED modeling also included roads and fire. Unlike baseline modeling, WEPP effects modeling does not include roads.

New sediment modeling was not performed for the 2022 proposed action because the project is reduced in size, and modeled effects from sediment are expected to be less, when compared to the 2019 proposed action and sediment modeling. Sediment model results based on the 2019 proposed action are compared to the 2022 proposed action in this section.

For the previous 2019 proposed action, the NPCNF performed a sediment yield analysis in their National Environmental Protection Act (NEPA) and BA documents using NEZSED and FISHSED models to determine if the proposed action would cause sediment yield increases in any of the prescription watersheds that would exceed the thresholds for B and C channels. These models were designed for comparison of project alternatives prior to implementation and were not intended for quantitative analysis of sediment delivery. The model predicted action-related sediment increases of 10 percent to 32 percent over base in affected Clear Cree subwatersheds. Those predicted yields for the 2019 proposed action were generally less than the predicted threshold for effects on substrate condition. For the 2022 proposed action, road work has remained approximately the same but with greatly reduced harvest so model predictions would be less than those when compared to 2019 modeling.

The WEPP modeling was used to estimate sediment delivery from harvest, prescribed fire, and wildfire (Elliot and Miller 2017). Based on the 2019 proposed action, WEPP modeling showed an 8.6 percent increase in sediment delivery from harvest activities but this analysis did not include road activity. When compared to 2019, the 2022 proposed action has less than half the regeneration harvest and only 75 percent of the overall harvest indicating modeled sediment effects for the 2022 action would be less than for the 2019 action. Due to the limitations of sediment modeling and the size and duration of this project, NMFS examined more closely how the specific components of the action are likely to reduce or increase existing sediment delivery and avoid/minimize additional delivery.

PACFISH RHCAs

Sediment delivery to streams from timber harvest areas will be minimized with implementation of the following: (1) PACFISH buffers will be applied to all RHCAs and landslide prone areas; (2) BMPs will be applied, including on skid trails and yarding corridors to reduce erosion and risk of sediment delivery to streams; and (3) implementation monitoring/adaptive management. PACFISH buffers exclude timber harvest in streamside, wetland, and landslide prone RHCAs. This helps prevent overland sediment delivery from timber harvest areas to streams, and maintains slope stability.

PACFISH buffers are very effective at preventing action-generated sediment delivery to streams. During Clearwater National Forests' annual monitoring of BMPs (including PACFISH buffers) from 1990 to 2002, sediment delivery to streams was observed in only 77 of 3,524 observations (2 percent) with the majority of delivery originating from the roads (USFS 2003). During onsite harvest unit layout, planned harvest areas sometimes are revised or dropped to accommodate PACFISH buffering, and this typically results in a 20–35 percent reduction in harvest area. This reduction in harvest area simply reduces the area of soil disturbance and sediment available for erosion and delivery. In addition, PACFISH buffers preclude harvest in and along landslide prone areas, thus timber harvest should not increase the risk of mass wasting from landslide prone slopes.

Implementation of PACFISH buffers has proven to be effective at preventing sediment delivery from harvest areas.

Skid trails and landings

Skid trails, including skyline yarding corridors, and landings created for proposed ground-based and skyline yarding activities can compact soils, decrease infiltration rates and may lead to increased erosion and channelized flow (Croke and Mockler 2001). Skid trail and landing BMPs will be implemented to minimize soil disturbance, erosion, channelized flow, and sediment delivery. These BMPs include avoiding ground-based skidding on steep slopes over 35 percent, restricting skidding activities in wet soil conditions, locating trails and landings outside of RHCAs, and using existing skid trails and landings. No specific BMPs were given to avoid creating converging skid trails, which could concentrate and channelize flow; however, adding drainage features such as water bars and slash to skid trails is standard practice when signs of erosion occur. In addition, PACFISH buffers will minimize delivery to streams from channelized flow if it occurs. Following use, skid trails and landings will be de-compacted and LWD will be applied to bare soils to increase infiltration and minimize erosion.

The harvest design features and BMPs to be implemented on this project have been extensively monitored on the NPCNF and have been shown to be very effective in preventing sediment delivery into streams from timber harvest units. Annual implementation and effectiveness monitoring of PACFISH buffers in the action area will be included in the NPCNF's Annual Monitoring and Evaluation Report. Results from this monitoring will be used in adaptive management of ongoing project actions to further minimize or avoid sediment delivery to streams from timber harvest. Sediment delivery to streams from skidding and landings is expected to be low because of PACFISH buffers, locating landings outside of RHCAs, and other BMPs designed to prevent or minimize soil disturbance (e.g., avoiding working in wet conditions and avoiding ground-based skidding on steep slopes). Because of these BMPs, NMFS expects sediment delivery from yarding to be kept to low levels and not have adverse effects on steelhead or stream substrate.

Prescribed Fire Treatments

Project actions include prescribed (landscape scale) and pile burning. There are 1,371 acres of prescribed burning planned in the western boundary areas to reduce hazardous fuels along the Wildland Urban Interface.

Bêche et al. (2005) found that sediment was not affected and macroinvertebrates communities recovered in watershed streams a year after prescribed fire (with ignition in riparian areas) of low to moderate intensity. For 3 years following a prescribed burn in ponderosa pine forest, Arkle and Pilliod (2010) found no detectable changes in sediment, riparian or stream habitats, macroinvertebrates, and fish.

Prescribed fire effects from this project are expected to be similar to those observed by Bêche et al. (2005) and Arkle and Pilliod (2010). The most important prescribed fire BMPs for minimizing the risk of moderate to high severity burns, soil disturbance, and sediment delivery include no ignition in RHCAs and burning under conditions that favor low intensity fires. The design features and

BMPs to be implemented on this project have been extensively monitored on the NPCNF and have been shown to be very effective in preventing sediment movement into streams from prescribed burn areas. With implementation of the BMPs and design features, effects to stream substrate and steelhead from prescribed burning are expected to be negligible.

Roads

The NPCNF roads have significant potential to increase erosion and sedimentation (Patric 1976; Swift and Burns 1999; Aust and Blinn 2004; Grace 2005). The NPCNF roads can alter hillslope hydrology by creating compact and less permeable surfaces (Megahan 1972), decreasing infiltration (Grace 2005), and increasing drainage networks with road surfaces and ditches (Wemple et al. 1996; Croke et al. 2001; Croke and Mockler 2001; Jackson et al. 2005), thus resulting in increased overland flow, erosion, and sedimentation during rain events. Erosion rates or yield, have been shown in monitoring and research studies to be higher from roads and log landings than from adjacent harvested and undisturbed areas (Yoho 1980; Rothwell 1983; Arthur et al. 1998). Sediment yield is the amount of sediment produced or passing a point from an area or feature, sediment delivery is the amount of sediment reaching a stream (Luce et al. 2001). Controls on sediment yield from roads include road slope and length, surface material, soil texture, and vegetative cover (Luce et al. 2001) with surface condition being affected by traffic and maintenance levels (Luce and Black 2001) and delivery dependent on precipitation duration and intensity.

The proposed temporary road construction, and road reconstruction, reconditioning, and decommissioning will be implemented to facilitate timber harvest and ultimately reduce roads on the landscape (Table 3). These actions will replace 66 culverts on haul routes, and remove 13 culverts during decommissioning of 13.2 miles of roads (Table 3), which will reduce the long-term risk of culvert and road failure, and its consequent large delivery of fine sediment. Common to all of the proposed road work is ground disturbance that has the potential to increase short-term sediment yield, and upgrades or decommissioning that will reduce long-term sediment yield. The following analysis will consider each type of road work and its contribution to short- and long-term sediment yield and delivery. Mileage and culvert numbers for each activity by watershed can be found in Table 3. Details of these activities are discussed below.

Temporary road construction

Temporary roads (17.1 miles) will be constructed to harvest currently inaccessible harvest units. Temporary roads are narrower and require only minimal construction compared to standard engineered permanent roads. The BMPs that prevent sediment delivery to streams from temporary roads include: (1) No water crossings; (2) temporary roads are built on or very near ridge tops and not on landslide prone slopes; and (3) temporary roads will be constructed and obliterated within 4 years. Obliteration includes recontouring, decompaction, addition of woody material for soil productivity, and erosion protection. Ridgetop roads contribute little to sediment delivery to streams because they have little drainage area above them to increase flow on the roads and have no direct surface connection to the stream network below (Megahan and Ketchusen 1996). As a result, there are no direct pathways for sediment to enter streams from temporary roads. Field reviews and monitoring of temporary roads with these design features and ridge top locations have shown no sediment delivery to streams. Because of the lack of water crossings, the near or on ridge top

locations, and the short 4-year duration before obliteration, temporary roads are not expected to create any short-term pulses or long-term chronic inputs of sediment. Therefore, negligible if any effects to substrate and thus steelhead are expected from temporary roads.

Road Reconstruction and Reconditioning

Road reconstruction (76.8 miles) and reconditioning (32.5 miles) are designed to prepare roads for increased haul traffic. The most important BMPs or actions that will reduce the potential for sediment delivery from the road system are the addition of cross drain structures and culvert replacements or upgrades, application of surface aggregate gravel materials, or outsloping during reconstruction. Realignment and reshaping may include reopening grown-over roads, and cut and fill slopes that have significant areas of ground disturbance which may capture groundwater and in turn can increase erosion rates. During reconstruction and reconditioning, ground or road surface disturbing activities will increase bare soil area and make more fine sediment available for transport (yield) with only a portion being delivered in the short term. Although sediment yield will increase with an increase in bare soil area, most of the mobilized sediment will not be delivered to streams, in part because of the position in the drainage network and also from application of BMPs such as sediment control devices and stabilizing bare soil areas by replanting vegetation. Sediment yield will decrease over 2 years by 70 percent to 90 percent while vegetation reestablishes on bare soil areas, road shoulders, and ditches (Black and Luce 1999; Megahan et al. 1991). This work will contribute to short-term sediment increases that are unlikely to be measurable, and will be dispersed across the project area and time without adverse effects to steelhead. The long-term effects from additional cross drains, culvert upgrades, and the application of surface gravel are discussed in the following paragraphs.

Cross Drains

Road surfaces are important hydrologic pathways which affect the volume and distribution of overland flow; and alter the channel network extent, pattern, and processes (Croke et al. 2005). Water control structures, such as ditches with cross drains, broad based dips, water bars, and turnouts, are used to drain in-sloped road surfaces minimize the travel length of overland flow, and divert water to the forest floor (Keller and Sherar 2003). Brown et al. (2013) found that road segments with excessive lengths between water control structures and inadequate vegetative surface cover delivered the most sediment. In addition, Luce and Black (1999) found that ditch cleaning can produce greater sediment yields than road grading. Increasing the number of cross drains immediately reduces upslope drainage area that collects water, reduces erosion, and reduces surface water connectivity from road segments to streams (Brown et al. 2013). Cross drains direct water to the forest floor where sediment is filtered out while the water infiltrates into the soil. If the distance from a cross drain outfall to a stream is too short for complete filtering, sediment is delivered to the stream. Damian (2003) found that sediment delivery from roads is minimized by placing cross drains within 200 feet of stream crossings and as close as possible to maintain complete filtering of sediment.

A key BMP of the project for minimizing short-term sediment delivery from reconstructed road segments is the addition of cross drain culverts near stream crossings prior to other upslope road work and haul. On reconstructed road segments, cross drains would be installed prior to road prism

shaping and ditch reconstruction activities that are upslope of the new cross drain sites, such that sediment generated from subsequent activities would be de-coupled from the stream. Cross drains will be installed within 200 feet from live streams to minimize sediment delivery to streams from road surfaces and ditches. These cross drains will remain on the road system to facilitate long-term reductions in sediment delivery to streams. The proposed action includes implementation monitoring of road reconstruction and reconditioning activities in particular to verify that cross drains are installed first in the reconstruction process and effectively disconnect from the stream network most of the ground disturbance associated with reconstruction. Following cross drain work, it is estimated that only 6 percent of the haul road network will drain to stream crossings. With cross drain spacing optimized prior to haul, road system drainage should be improved with only a small portion of the haul road network delivering sediment at stream crossings.

Culverts

Culvert work will mobilize and deposit fine sediment into the stream channel. During culvert work, most of the sediment is remobilized from the stream channel or from bedding material placed in the channel during culvert installation (Foltz 2008). Culvert work on small streams in Idaho during low flow resulted in fine sediment deposits in channels and pools, but these deposits were transported away by annual peak flows (Foltz et al. 2008). Following culvert work, Bakke et al. (2002) found that during subsequent peak flow periods, channel incision, lateral scour, and channel readjustments can add more sediment to the stream than during culvert work itself, but those effects also occur during periods of high sediment transport and redistribution. For long-term sediment control, adding rock adjacent to culvert outfall areas will reduce the risk of erosive gullying and incision below the culverts (Megahan and Ketchusen 1996). Foltz et al. (2008) found that using sediment control BMPs during culvert work resulted in a 96 percent reduction of added sediment when compared to no sediment controls.

There are 66 culverts proposed for replacement on haul roads and will be sized to accommodate a 100-year flood event to reduce the chance of failure, road damage, and excessive erosion and sediment delivery. One of these replacements is within 600 feet of critical habitat and the closest known steelhead presence to any of the culverts is 0.7 miles (4,000 feet) downstream. Despite this distance, and as discussed above, there are three culvert replacements that may have steelhead present and will be monitored for turbidity and steelhead presence. During culvert work, fine sediment is expected to deposit in channels or pools a maximum of 600 feet downstream and remain until the next high water. The BMPs and a low flow work window will be used to minimize fine sediment mobilization and deposition. Based on the Stillwater (2015) steelhead surveys, steelhead are not expected to be within 600 feet of the culvert replacements or the downstream deposition zones. For the three monitored culvert replacements, if juvenile steelhead were present in the deposition zones, they would be in very low numbers and free to move to other areas of the streams with more favorable substrate conditions (passage will be maintained except when initially watering a bypass channel). To counter short- and long-term sediment additions caused by channel adjustments and erosion at all culvert sites, the Forest proposes the addition of rock adjacent to culvert outfall areas. Culvert replacements will cause short-term increases in deposited sediment within 600 feet downstream. The long-term risk of culvert failure resulting in larger sediment delivery will be kept to low levels with the addition of rock reinforcement around the new culverts. Sediment delivery to substrates from culvert work will be periodic and dispersed throughout the

project and will have small temporary local, and small combined mainstem, adverse effects to stream substrates and steelhead.

Gravel Aggregate

The use of road surface gravel aggregate (i.e., 3 to 6 inches depth of coarse gravel) helps minimize soil erosion, on active roads, and greatly reduces fine sediment introduction to streams at crossings (Brown et al. 2013). Graveling of road surfaces reduces sediment production (erosion) by reducing the surface area of soil exposed to raindrop impact, tire friction, and adverse effects of vehicular weight (Megahan et al. 1991). Graveling of roads and ditches increases surface roughness which decreases water velocity, runoff, sheet erosion, and sediment transport from the road surface (Appelboom et al. 2002). Brown et al. (2013) found that bare soil roads generated 7.5 times more sediment than graveled roads. Following the application of aggregate, reductions in fine sediment delivery are concurrent with increases in plant cover on the roadside (Megahan et al. 1991) or when surface fines have washed away, the road surface stabilizes, and becomes “armored” (Megahan et al. 1991; Luce and Black 1999). Immediate results can vary from short term increases in sediment yield that continue through the winter (Megahan et al. 1991; Swift 1984) to first year reductions of 67 percent to 79 percent (Appelboom 2002; Burroughs et al. 1985 [cited in Burroughs and King 1989]; MacDonald 2005; Swift 1984). Other studies found that sediment yield reductions were complete after 3 years (Luce and Black 1999) or delivery reduced by 53 percent to 88 percent within 4 years (Appelboom 2002; Kochenderfer and Helvey 1987; Megahan 1991). In summary, graveling roads can create an immediate increase in sediment delivery due to surface disturbance but significant reductions in fine sediment delivery, when compared to native soil roads, will occur within 1 to 4 years.

Gravel will be applied to all stream crossings and road sections where currently absent but needed for stability. The application would occur concurrently with road preparation for haul. Implementation monitoring of road reconstruction and reconditioning activities would occur on all reconstructed segments on which log-haul occurs, or is planned to occur, to verify that timing of reconstruction activities (including aggregate application) adheres to BMPs. Short-term sedimentation from a gravel application is caused by road surface disturbance and may last through the first winter. Gravel applications can result in a 53 percent to 88 percent reduction in fine sediment delivery from treated roads within 5 months to 4 years and continue into the long term after haul has ceased. These reductions in fine sediment will help mitigate the substantial increases in haul traffic and help provide long-term reductions of road surface fine sediment from the most problematic existing road segments in the action area. Application of gravel will benefit substrate and steelhead by reducing potential road surface erosion and sediment delivery.

Haul

Log-haul can generate sediment as a result of road surface erosion and dust. Where ditch lines terminate at stream crossings, this generated sediment can be delivered to streams. Large amounts of haul, or hauling in wet conditions, can cause rutting of roads. Ruts are channels that can route water and sediment past cross drains or out sloped sections of road to stream crossings. This rutting can also accumulate flow which accelerates erosion of fine sediments from the road surface and adds more fine sediment to streams.

As proposed, 48 MMBF will be hauled from the action area in an estimated 10,280 round-trip truckloads on three main haul routes including the 286, 650, and 1106 roads. The highest amount of haul will occur on Road 286 carrying an estimated 62 percent of the haul throughout the duration of the proposed sales. The 650 and 1106 roads will carry an estimated 19 percent each of the total haul. These main routes are USFS system roads which are fully graveled, sized, and designed to resist damage from this rate of haul. Minor haul routes will access individual timber sales with an estimated five to 20 round trips a day which is at or below the average for a system road during a timber sale. Although daily use may not be above average for a sale, these roads will be used continuously for the duration of a sale(s) under allowable haul conditions. Road inspections and maintenance are commensurate with use so main and minor haul routes will be kept in fully functioning condition during haul as described below.

As described above in the spill and cross drain sections (Sections 2.4.1.4 and 2.4.1.5 above), sediment delivery will occur at stream crossings but these stream crossings are high in the watershed and significantly upstream from ESA-listed fish and critical habitat in most cases. Of the 239 stream crossings on haul routes, 23 are over fish bearing streams and eight of these are paved bridges which will not generate sediment for delivery (231 unpaved). The remaining 216 stream crossings are near ridgetops over non-fish-bearing streams at least 0.7 miles upstream from known ESA-listed fish presence; 215 are over 600 feet from steelhead critical habitat. Considering the general location of stream crossings, overlapping sales, and extended time of haul, NMFS expects the majority of sediment effects from haul to be small and immediately below each source site, and similarly small in downstream areas occupied by steelhead. Although sediment from multiple individual crossings of non-fish-bearing streams can combine in the downstream reaches occupied by steelhead, the larger size of the collecting streams and the process of that mobilization and deposition (largely during spring high flow) will tend to create relatively small changes, and be limited to the existing downstream depositional areas. The magnitude of the sediment deposition relies on BMPs that limit sediment delivery from upstream sources as discussed below.

Project BMPs will minimize sediment delivery from haul. With installation of cross drains and out sloped roads draining to the forest floor, only 6 percent of haul road miles drain to streams, and only 1.4 percent drain to fish bearing streams. Road use will be limited during wet periods with haul occurring during dry or frozen conditions. The application of dust abatement is an important factor in stabilizing road surfaces to minimize sediment production and delivery. Project BMPs for road inspection (discussed below) and maintenance will insure that road drainage is functioning properly to route runoff and sediment to the forest floor in most cases and minimize sediment delivery from the short sections of road draining into stream crossings.

The NPCNF proposes to minimize sediment delivery at stream crossings primarily through the aforementioned designs and measures and through contract administration, including monitoring/response to PED (Section 1.3.3). NMFS recognizes that due to weather, design problems, or unforeseen circumstances, there is potential for road drainage features to fail. Under these circumstances, sediment delivery or imminent delivery at stream crossings is greater than anticipated. Despite the quick response to these problems as proposed, NMFS expects that PED will be identified at a limited number of locations on active haul routes. In NMFS' judgement, PED would be unlikely to occur at more than approximately one quarter of the stream crossings. Taking

a conservative approach, in NMFS' judgement, and formally accepted by the NPCNF³, PED at more than approximately one quarter of stream crossings over fish bearing streams on active haul routes represents an elevated risk of adverse effects to steelhead and their habitat from PED when compared to non-fish-bearing crossings. As noted in the proposed action, identified PED will be corrected in a matter of a few days.

The PED to a perennial stream from a road system may occur following a precipitation event that causes sediment delivery, or creates conditions of imminent sediment delivery, to that stream. Remediation of PED on an active haul route is a contractual responsibility of the timber purchaser(s) using the haul route. By NPCNF's definition, PED involves sediment delivery or imminent sediment delivery conditions on a scale that requires mechanized correction (versus, for instance hand removal of sticks from a culvert). The PED may involve any area of a road's drainage system and any point on the road prism where water and sediment can drain directly to a perennial stream; this includes any cross drain or other feature which is malfunctioning and routing runoff to a perennial stream. Due to the physical composition of the road surface along haul routes (typically soil and gravel), roads may need time to dry to become drivable (i.e., any vehicle must not leave ruts 3 inches deep or more for 50 feet or more) following a precipitation event. Once drivable, a Sales Administrator will begin inspecting active haul routes for PED and unsafe conditions. Within 2 days of becoming drivable, a Sale Administrator(s) must notify the purchaser(s) of any observed PED. Once notified, the purchaser(s) must remediate all PED within 4 days.

NMFS expects that sediment delivered to the stream crossings from haul will initially travel a maximum of 600 feet downstream. During storm events and annual runoff, the small project related depositions immediately below stream crossings will be redistributed farther downstream, and in that process will become more dispersed and diffuse in their effect on stream substrate. Ninety percent of crossings are over non-fish-bearing streams and are at least 600 feet above surveyed steelhead presence (Stillwater 2015) and critical habitat. Haul will increase detachment and areal dispersion of road surface fine sediments. A portion of these fines will be transported to streams through ditches to stream crossings during precipitation events large enough to mobilize these particles. Under these conditions, flows will transport sediment through the stream system following successive waves of precipitation events. These waves, attenuated from each tributary, and the temporal distribution of timber sales and haul, could create a small but constant effect on lower elevation mainstem critical habitats and steelhead throughout the project time frame. However, because only 6 percent of the haul network drains to streams, and haul routes are located in headwaters with crossings over very small streams, the amount of fine sediment added to larger fish-bearing streams and critical habitat downstream will be small and dispersed. For the 1106 Road, where it is adjacent to Green Creek, dust abatement will limit dust from the road. Fine sediment delivered at stream crossings during summer storms is not expected to travel more than 600-feet downstream, impair substrates for use by steelhead in this short reach, or be detectable in the receiving South Fork Clearwater River.

In summary, sediment delivery from haul will be minimized through: (1) BMPs; (2) monitoring and repairs of PED; and (3) dispersed timing and location of sales. Despite these minimizing factors,

³ This monitoring threshold was present in previous consultations with the NPCNF (NMFS No: WCRO-2019-00545, WCRO-2019-02002, WCRO-2019-00351).

sediment delivery from haul will be sustained throughout the project and will have small temporary local, and small combined mainstem, adverse effects to stream substrates and steelhead growth.

Road Decommissioning

Road decommissioning is a ground disturbing activity that results in short-term increase in sediment yield but reduces long-term chronic sediment delivery and landslide risk (Switalski et al. 2004). Ripping and recontouring alleviates most of the risks resulting from concentrated flow including gullying, mass wasting, and increases in peak flows (Luce et al. 2001). However, the unconsolidated material retains some risk of failure, especially on lower slope locations (Madej 2001). In addition, channel adjustment (erosion) may occur following crossing removals, with erosion risk increasing with drainage area, stream gradient, and the volume of fill removed (Madej 2001). As with all ground disturbing decommissioning activities, rapid regrowth of vegetation (Foltz et al. 2008), and in particular tall trees for recontoured slopes, is essential for the success of the decommissioning (Luce et al. 2001). Where soil organic matter is lacking following decommissioning, soil amendments and/or plantings are recommended (Luce et al. 2001).

Proposed road decommissioning (13.2 miles; 13 culverts) includes activities that result in the stabilization and restoration of unneeded roads to a more natural state. Most roads proposed for decommissioning would be fully recontoured and all would be permanently closed. Local short-term increases are expected in sediment delivery and deposition in substrate from soil disturbance and stream crossing removal. The NPCNF will plant shrubs and seed where necessary as erosion control and to facilitate the reestablishment of vegetation to promote rapid regrowth and stabilization of disturbed areas. Reductions in fine sediment content in downstream substrates are expected to be evident in 1 to 2 years and continue into the long-term. On larger scales, studies have linked increased road density to increased sediment delivery (Luce et al. 2001), reduced fish abundance (Eaglin and Hubert 1993), and limited fish occurrence (Dunham and Rieman 1999). Reduction in density of road and stream crossings is expected to have the opposite effect. Proposed road decommissioning is expected to have a small long-term benefit on stream substrate and fish abundance at the watershed scale.

Deposited Sediment Summary

Harvest, prescribed fire, road work, and haul will all cause soil disturbance making sediment more available for short-term sediment delivery to streams over the period of this action and a few years beyond until soils and road surfaces stabilize. Any fine sediment delivered to streams will decrease the utility of substrates for steelhead until the fine sediment clears through successive high flows. NEZSED sediment modeling show elevated increases in sediment delivery and FISHSED modeling predicts little effect to stream substrates from project related sediment increases. Because of sediment model limitations, sediment analysis focuses on BMPs that will minimize all sources of sediment delivery from project actions. PACFISH buffering of creeks and landslide prone areas will limit sediment delivery from upland harvest to a low number of isolated incidences at the action area scale. Burning is restricted to times and conditions that are likely to result in low intensity mosaic patterns with minimal impact to riparian areas, substrates, and steelhead.

Installing cross drains prior to other road work and haul, culvert replacements, locating landings away from RHCAs, locating temporary roads near ridgetops, and road decommissioning will minimize the amount of road surface draining directly to streams and will reduce the risk of culvert failure. For road actions, following a 1- to 3-year stabilization period for soil and road surface, the mitigation measures will reduce short- and long-term chronic sediment delivery, and risk of larger episodic, sediment delivery, from the road system. Roads will be upgraded a year prior to a sale and haul will continue for about 4 years during a sale. Stream reaches in or near a sale boundary are likely to have increases in short-term sediment delivery for the duration of haul and a couple of years following haul. However, early installation of cross drains will greatly limit the amount of road surface draining to streams and 90 percent of stream crossings are over non-fish-bearing streams. In addition, proposed monitoring of active haul routes will insure damaged roads with the potential for, or active, sediment delivery will be fixed as soon as possible (days). Mainstem streams lower in the watershed may have longer periods of elevated fine sediment deposition but at an attenuated intensity compared to stream reaches in harvest activity areas directly below stream crossings.

Steelhead spawning and rearing habitat is widely distributed in the watershed, providing some resilience with respect to disturbance in localized areas. At the three culvert replacements that will be monitored for turbidity, and 23 haul stream crossings that may receive reconditioning or reconstruction, steelhead may be present and experience small adverse effects from sedimentation of substrates. Small adverse effects from sediment would occur at the subwatershed scale during individual timber sale activity. Due to timber sales overlapping in time, lower mainstem reaches of some subwatersheds and the mainstem Clear Creek will have more protracted but attenuated minor adverse effects to spawning and rearing substrates and thus to steelhead. Culvert replacements and removals, and haul over stream crossings, in non-fish-bearing streams will not have immediate effects to steelhead but would contribute the protracted and attenuated effects to downstream substrates.

2.5.1.6 Changes to Streamflow from Harvest (Equivalent Clearcut Area)

Canopy removal from timber harvest and road building has the potential to cause changes to water yield from the landscape. Removal of canopy reduces evapotranspiration, reduces loss of moisture from interception of precipitation, and alters snow accumulation and melt patterns, all of which can increase water yield (average annual or monthly flow) from the landscape and increase small to moderate peak stream flows. Increases in these peak flows can cause stream channel scour and bank erosion resulting in an increase in fine sediment supply to streams, with potential adverse effects to stream substrates and steelhead.

In considering the effects of timber harvest on peak flow and effects of those peak flow increases on stream channels and fish habitat, prior studies have identified key points, including the following:

- (1) Increases in flow are proportional to increased area harvested (Bosch and Hewlett 1982, Keppler and Ziemer 1990; Grant et al. 2008).
- (2) Peak flow increases of 10 percent represent the lower limit of detection (Grant et al. 2008).

- (3) For small watersheds less than 10 square kilometers (less than 2,470 acres), changes in peak flows generally become detectable for transient snow zone (TSZ) watersheds when less than 15 percent of a basin is harvested (Grant et al. 2008).
- (4) Effects will be greatest on smaller first and second order drainages because flow paths are shorter and more synchronized when compared to larger drainages (NMFS 2005).
- (5) Riparian buffers serve to reduce harvest area, contribute LWD, and maintain bank stability and resilience during floods (NMFS 2005).
- (6) It is difficult to separate peak streamflow effects of timber harvest from roads because road ditches capture groundwater and shorten flow paths (Megahan 1972, Wemple et al. 1996).
- (7) Harvest induced changes in peak flows will occur in relatively moderate peak flows of less than 1- to 5-year recurrence intervals (Harr 1976, 1986, Ziemer 1998, Beschta et al. 2000, Grant et al. 2008).
- (8) It is unclear if changes to peak flow from timber harvest alone have significant effects on salmonid habitat and populations if riparian areas and floodplains are functioning and roads are kept hydrologically disconnected from the stream system (NMFS 2005).
- (9) Flows must have sufficient force to move bed-load material to affect a channel's physical structure (Grant et al. 2008).
- (10) Peak flows changes associated with harvest will have little effect on channels with either cobble and larger substrates or gradients over 10 percent (Grant et al. 2008).
- (11) Harvest induced peak flow effects on channel morphology should be confined to channels with gradient equal to or less than 2 percent and streambeds and banks of gravel or finer material (Grant et al. 2008).
- (12) If channels have beds of fine gravel or sand, including those with gradients over 2 percent, a much closer hydrologic and geomorphic analysis is warranted (Grant et al. 2008).

As a general guideline for third to fifth order streams, NMFS' Matrix of Pathways and Indicators (NMFS 1996) specify a less than 15 percent ECA as low risk for changes in peak flows. Grant et al. (2008) cites a 10 percent change in peak flows as the lower detection limit for changes in peak flows. In addition, Grant et al. (2008) developed a linear relationship between percent of area harvested and average percent change in streamflow for the TSZ. (The Clear Creek watershed harvest activities are in the TSZ.) Using the relationship developed in Grant et al. (2008), an ECA of 15 percent equates to a 10 percent change in peak flow. Grant et al. (2008) also emphasizes that peak streamflow response to ECA can vary with site conditions. The NPCNF cites several studies that support ECAs of 20 percent to 30 percent for third to fifth order streams before a 10 percent change in peak flows can be detected (NPCNF 2015).

A paired watershed study by Gerhardt (1998) in the Selway River watershed (watershed adjacent to Clear Creek), illustrates the need for ECA analysis at multiple scales including first and second order stream drainages. In the study, road building and clearcutting resulted in an ECA of 15 percent for a third order stream and up to 80 percent in upstream first and second order streams. Although there was no change in flow patterns in the third order stream (King 1989), peak flows increased 15 percent to 36 percent in the first and second order streams. In addition, following high flow events 3 to 7 years after harvest, sediment traps showed greater gravel and cobble movement when compared to the non-harvested control watershed. The consensus at the time was that the greater movement of sediment was caused by ECA related flow increases and consequent channel scour in the first and second order streams. This study demonstrated that, to capture the full effects of ECA, ECA changes to flow and sediment supply should include analysis at the scale of first and second order stream drainages.

The NPCNF did not re-do an ECA analysis for the 2022 proposed action because harvest was significantly reduced compared to the 2019 proposed action and the associated ECA analysis. Because of the reductions in harvest, ECA in a 2022 analysis would have been less than the 10 to 15 percent ECA analyzed for the 2019 proposed action, at the prescription watershed scale, for third through fifth order streams (NMFS 2015) and modeling would not have suggested increases in moderate peak streamflows.

Additionally, NMFS spot checked ECA for four areas with high intrinsic potential for steelhead presence; Clear Creek below Pine Knob Creek, Clear Creek south of Big Cedar Creek, and two points on the South Fork Clear Creek. Estimated ECA for these four areas in these third to fifth order streams, and the prescription watersheds are below the 15 to 30 percent thresholds where changes in 1- to 5-year recurrence interval peak flows may be detected (Harr 1976, Harr 1986, Ziemer 1998, Beschta et al. 2000, Grant et al. 2008). Therefore, ECAs for these areas are not expected to cause an appreciable increase in channel response (movement of streambed and streambank material) at that scale.

The NPCNF conducted field surveys of channel sensitivity and condition to help with analysis of ECA effects to flow in first and second order drainages where ECA was high. The USFS (Benoit 1973) established guidelines for ECA thresholds based on stream elevation and stream condition. Depending upon those variables, the guidelines allow for ECAs of up to 70 percent in first order streams and 50 percent in second order streams before causing increases in water yield of greater than 10 percent. The NPCNF supplemental information shows that first order streams with proposed regeneration harvest are at elevations between 3,500 and 5,500 feet (all in the TSZ) and generally in good condition, with a few stream reaches in fair condition. Using the guidance relationship for streams in good condition, first order streams at 3,500 feet are allowed an approximate ECA of less than or equal to 23 percent, and for 5,500 feet the approximate allowed ECA is less than or equal to 63 percent. Grant et al. (2008) presents a linear relationship for small TSZ watersheds relating percentage ECA to percent change in peak flows. Using Grant's relationship, ECAs of 23 percent to 63 percent would be expected to cause peak flow increases of approximately 11 percent to 17 percent. Peak flow increases of this magnitude would increase the frequency of moderate peak flows capable of moving gravel and smaller substrates but unlikely to cause significant channel or streambank erosion and consequent sedimentation of substrates.

NMFS used a geographical information system and an approximate 30 percent areal coverage or greater of regeneration harvest as the ECA⁴ screening threshold as an indicator of potential changes to peak flow in first and second order streams. This screening assumed there would be a conservative 20 percent reduction (the BA states the actual reduction in practice is 25-30 percent due to PACFISH buffering exclusions) in the map-delineated harvest area due to required area exclusions during layout (e.g. for riparian and unstable areas). Analysis areas were selected by visual inspection of a map of all proposed regeneration harvest units within first and second order drainages. The conservative 30 percent threshold was based on the following: (1) The Clear Creek watershed is in the TSZ, so effects from harvest should be similar at the range of proposed harvest elevations; and (2) using the relationship for small watersheds in the TSZ (Grant et al. 2008), a 30 percent ECA would be expected to increase peak flows by 12 percent, an increase slightly above detectable limit. It should be noted that during harvest layout, due to PACFISH buffering exclusions, actual ECA values are likely to be less than those reported in this analysis.

NMFS identified the area burned by the 2015 Baldy Fire in the South Fork Clear Creek drainage as a possible area of concern for action effects combining with this baseline. There are no harvest units, or combination of harvest units, in the burn area that would be of concern based on their ECA below 30 percent. Because of the limited fire acreage, good to excellent condition and larger cobble substrates in channels, abundance of large wood, stable stream banks, ridge top location of the high severity burn areas, and regrowth of ground vegetation, there is little potential for sediment transport into the South Fork Clear Creek based on flow effects from harvest ECA in the Baldy Fire area.

Harvest unit 109 in the Clear Creek subwatershed surrounds a second order watershed that drains directly into occupied steelhead critical habitat and has a proposed harvest of 40 percent. Using information from Grant et al. (2008), this could result in an increase of 14 percent in moderate peak flows. Headwater reaches in Unit 109 have gradients of 2 to 3 percent, and are dominated by sand and gravel with underlying cobble substrates. Although these finer sediments are more vulnerable to scour, banks and channels are not likely to scour because they are in good stable condition, have underlying large substrate, have functioning floodplains, and large wood. If realized, increases in moderate peak flows in unit 109 stream reaches may cause minor additional fine sediment transport to downstream critical habitat in Clear Creek. This additional sediment would enter the much larger Clear Creek and move through the system with the potential to settle in substrates and cause short term, minor adverse effects to rearing steelhead, such a small reduction in invertebrate forage and thus possibly minor effects on growth of some individual fish.

The areas of the West Fork and Hoodoo Creek had one area identified as having ECAs potentially above 30 percent under the proposed action. Tributaries associated with harvest unit 230 (West Fork) and 234 (Hoodoo Creek) will be commercially thinned over a significant portion of several first and second order stream drainages. These drainages are significantly upstream of West Fork

⁴ Using percent regeneration harvest as a surrogate for ECA overestimates ECA because regeneration harvest is less than a clearcut, but at the same time underestimates ECA by not including roads. Roads can be a bigger factor than harvest in causing peak flow responses (Grant et al. 2008). However, the action includes disconnecting and minimizing road connections to the stream network. Although not precise, the overestimating and underestimating factors create somewhat of a balance, making percent regeneration harvest a reasonable approximation of percent ECA.

critical habitat. Unit 230 is over two miles above critical habitat and unit 234 is 0.8 miles above a passage barrier. Streams within these units are not of concern for significant channel scour because this commercial thinning is unlikely to cause significant changes to smaller peak flows, and channel characteristics would be resilient to scour. Although unit 234 channels were not surveyed directly, they are adjacent to other surveyed channels in the same watershed and assumed to have similar characteristics. Channels in unit 230 and 234 are steep (less than 2 percent) with cobble substrates and are in good condition. Because harvest intensity would be unlikely to cause detectable changes to small peak flows, and additional scour and transport of significant amounts of fine sediment is unlikely, the risk of adverse effects to downstream substrates and steelhead is low from these harvest areas.

ECA Summary

NMFS completed ECA analysis at the subwatershed to headwater (1st to 5th order) scales. Results show ECA related moderate peak flow changes would be undetectable, or less than 10 percent, in third to fifth order streams where steelhead and steelhead critical habitat are found. Without detectable increases in peak flow, channel scour, and associated addition of ECA-related sediment, project related increases in ECA are unlikely to cause adverse effects to steelhead.

NMFS analysis of first and second order watersheds with regeneration harvest revealed similarities between watersheds. Streams in these watersheds are characterized by steep gradients, large substrate, stable vegetated banks, and large wood, and are not expected to have detectable peak flow increases or appreciable scour from the changes in peak flows. However, one second order tributary to Clear Creek, coincident with regeneration harvest unit 109, is likely to have moderate increases in moderate peak flows resulting in minor scour and entrainment of sediment. The amount of additional sediment transport is expected to be limited, given that the peak flow increases could be just over detectable limits and channels in the area are in good condition. Potential channel responses from this watershed may cause some increase in sediment delivery and deposition in downstream spawning and rearing substrate as the channel readjusts over several years. Although steelhead can move to other areas, spawning and rearing habitat in this location would potentially be reduced for several years having a small adverse effect on juvenile steelhead.

2.5.1.7 Stream Temperature

Steelhead require cold water to successfully spawn and rear. Stream shading helps to maintain cold stream temperatures, and as shade increases, water temperature decreases (Murphy and Meehan 1991). Project activities that remove or alter vegetation that provides shading to streams have the potential to increase solar insolation and in turn increase stream temperatures. Brazier and Brown (1973) determined that an 80-foot buffer strip provided maximum shading on small coastal streams and Steinblums (1977) concluded that an 85-foot buffer strip provided stream shade similar to that of an undisturbed canopy. DeWalle (2010) found buffer widths of approximately 60 to 66 feet provided approximately 85percent to 90 percent of total shade to streams.

Proposed timber harvest, temporary road building, new landings, road preparation, road decommissioning, and culvert replacements will remove trees. However, no-harvest PACFISH buffers will be implemented so no harvest or new roads or landings will occur in RHCAs or affect stream shading. Existing haul roads cross streams through RHCAs and will require removal of

vegetation to clear running surfaces, meet width requirements, and replace culverts. There are 156.9 miles of haul roads with 6 percent (9.1 miles) of the haul road network draining to streams and only 1.4 percent (2.3 miles) draining to fish-bearing streams, indicating a relatively small potential for tree clearing at stream crossings to directly affect fish. For road preparation, the removal of vegetation affecting stream shade is expected to be limited to small areas; therefore, no detectable increase in stream temperatures are expected from road work near or at stream crossing sites. Vegetation may be removed for access and recontouring during road decommissioning. However, road decommissioning is limited to 13.2 miles with 13 culvert removals dispersed across the Clear Creek watershed. Reduced shade from clearing at decommissioning sites will be minimal and dispersed, and is not expected to cause significant stream warming.

Prescribed fires will not be ignited in RHCAs, but will be allowed to back burn into RHCAs, increasing the potential for tree and stream shade loss. As noted in the BA, observations made by the Clearwater Forest Fisheries Biologist, Pat Murphy, noted little change or effects to streams for burns on the North Fork Clearwater District after the Elizabeth and Snow Fires of 2000 and Boundary Junction Fire in 2007. These fires were natural fire starts without suppression, burned at low intensity, and burned less than five percent of riparian areas. Burns are done in spring and fall when fire is expected to be low intensity and proceed in a mosaic pattern based on varying humidity in riparian areas and proximity to streams.

Seasonal prescribed burning with implementation of BMPs may result in reductions of trees or other vegetation and loss of stream shading in localized areas. These incremental and localized reductions in shading are not expected to result in any detectable change in water temperatures at the local or subwatershed scale. Incidental prescribed fire in RHCAs may provide benefits to riparian function in the longer term by reducing fuels that have the potential to increase fire intensity, and increasing stand vigor resulting in long-term increases in shade.

In summary, the proposed actions related to harvest, road work, and prescribed burning may result in small, localized reductions in streamside vegetation and shade without measurable effects to stream temperatures or steelhead.

2.5.2 Effects on Critical Habitat

The action area contains designated critical habitat for SRB steelhead. The proposed action has the potential to affect the following steelhead PBFs of designated critical habitat (Table 6): (1) Water quality; (2) water quantity; (3) substrate; (4) forage; (5) natural cover/shelter; and (6) passage. Any modification of these PBFs may affect freshwater spawning, rearing, or migration in the action area. Proper function of these PBFs is necessary to support successful adult and juvenile migration, adult holding, spawning, rearing, and the growth and development of juvenile fish.

2.5.2.1 Water Quality

Road reconditioning, reconstruction, and decommissioning; increased road use, and crossing removal and/or replacement are expected to generate periodic turbidity pulses. The intensity and duration of these turbidity pulses will be minimized by implementing various BMPs (e.g., appropriate sediment erosion control measures, dewatering culvert work areas, cross drains, and gravelling). As discussed in the species effects section, only one culvert removal or replacement

is within 600 feet of designated critical habitat, and turbidity pulses are expected to be infrequent, temporary, and of low magnitude. Turbidity from sediment delivery associated with road reconstruction and road use is expected to be minor, particularly with implementation of cross drains that limit the length of road that drains into streams, gravelling and sediment control structures to reduce and contain erosion near stream crossings, and monitoring/response to PED at stream crossings.

The proposed action involves the storage and use of petroleum products and the use of equipment and vehicles in RHCAs. In addition, the high amount of logging-related traffic creates a greater potential for fuel spills near streams. As described in Section 2.5.1.3, above, the NPCNF has a long history of avoiding spills and has included minimization measures/BMPs to reduce the risk of spill reaching a stream. Because of the history and proactive BMPs, a spill that would have adverse effects on the water quality PBF is unlikely in the action area.

Contractors may spray $MgCl_2$ on roads to control dust. As discussed above in Section 2.5.1.3, proper application of the chemicals as required by NPCNF personnel and contractors, as well as road work that directs sediment and other road-related chemicals away from streams, will help keep dust abatement chemicals from entering streams at levels harmful to the water quality PBF in the action area.

Considering the information summarized above and described in more detail in the species effects section, the proposed action is not expected to affect the function and conservation value of the water quality PBF within the action area.

2.5.2.2 Water Quantity

The proposed action has the potential to alter streamflow through the removal of forest cover and water withdrawals for prescribed fire and dust abatement. Effects of moderate peak flow increases from forest cover removal were discussed previously in Section 2.5.1.6, above. With few exceptions, critical habitat is coincident with third or greater order streams in the Clear Creek watershed. Moderate increases in ECA at the third to fifth order stream scale (i.e., middle and upper reaches of steelhead habitat) are expected to cause undetectable increases in moderate peak flows in steelhead critical habitat. Those effects are not expected to be of sufficient magnitude to significantly alter the water quantity PBF in steelhead critical habitat in the action area.

As described in Section 2.5.1.2, above, the proposed action is authorizing the withdrawal of water to support fire suppression and control road dust. These withdrawals are expected to be infrequent and are expected to remove only a small portion (i.e., enough to fill a water truck, which requires less than 2 hours of pumping) of the total volume of water at any given time. In addition, a fish biologist or hydrologist will designate the locations for water withdrawals to maintain streamflow. Because the flow reductions will be small, infrequent, and temporary (i.e., water will not be continually withdrawn), they are not expected to appreciably alter the water quantity PBF in steelhead critical habitat in the action area.

In summary, the proposed action is not expected to change the function or conservation value of the water quantity PBF in the Clear Creek watershed.

2.5.2.3 *Substrate*

As discussed Section 2.5.1.2, above, increased sediment yield and delivery to streams in the Clear Creek watershed and Green Creek may occur in the short term. Although soil erosion from timber harvest activities and prescribed burning will increase, sediment delivery to streams from those activities should be effectively minimized through implementation of PACFISH buffers and other sediment control BMPs.

This action is most likely to affect sediment delivery and stream substrate conditions through activities involving roads. Road work, stream crossing work, and increased road traffic will add to road-generated sediment movement in the short term. Prior to other road work and increased use of the roads, the installation of cross drains will disconnect most of the road area from the stream network so that most of this road-related erosion and sediment movement will not result in delivery to streams. Road BMPs including outsloping, cross drains, gravelling, sediment control measures, and dust abatement, along with monitoring/response to PED at stream crossings, are expected to minimize new sediment inputs in the short term and ultimately reduce existing sediment delivery from roads to streams.

Data are not available to determine the extent to which the action's reduction in existing sediment deliveries from roads will offset new inputs of sediment from reconstruction and road use near streams. During precipitation events, road preparation, culvert removals and replacements, haul, and road decommissioning will cause sediment delivery and deposition directly downstream of stream crossings in the action area. Sediment that is delivered to streams is expected to settle out on substrate in localized low velocity areas (i.e., pools, stream margins, or low gradient spawning and rearing habitats) within a short distance downstream of stream crossings. In the short term, the sediment will move downstream (in less than 1- to 4-year intervals) becoming more diffuse before settling in the next depositional reach or leaving the watershed. The areas of harvest activity and road work in the subwatersheds of Clear Creek are somewhat separated in space and time, such that both sediment additions from new activities (to the extent that these are not minimized or offset on site) and sediment reductions from road removals and repairs a year or more earlier, would combine in mainstem Clear Creek. Because of that distribution of activity effects, and the minimization of effects at the sources and delivery points as noted above, substrate conditions are not expected to change appreciably in Clear Creek in the short term.

As discussed in Section 2.5.1.6, above, certain levels of ECA increases can affect peak flow detectably and can cause channel scour that would affect stream substrate. ECA values in harvest unit 109 were identified as having the potential to cause moderate increases in small peak flows upstream of critical habitat. Although these increases in flow will be attenuated in third and higher order streams, some channel scour from increased peak flow may occur in the first or second order streams above. This scour would cause fine sediment to move downstream into critical habitat in third or greater order reaches. This sediment is expected to be of limited quantity and dispersed in time and space in designated critical habitat. As a result, there will likely only be minor adverse effects to the substrate PBF and conservation value of steelhead critical habitat from ECA increases in harvest unit 109 for the duration of the project.

2.5.2.4 *Forage*

Macroinvertebrate forage may be affected by fine sediment deposited in substrates and may also be affected by road dust abatement chemicals that enter the stream.

As discussed in Section 2.5.2.3, above, the project may generate sediment pulses below stream crossings in the short term. Project road improvements and BMPs are expected to offset to some extent, and otherwise substantially minimize sediment deliveries such that effects on stream substrate are expected to be small, localized, and temporary. In a study with moderate levels of sediment increase from road improvements in a headwater stream drainage, little change in biomass of invertebrates was found (Kreutzweiser et al. 2005). Also, because sediment deposition may be localized, insect drift through the affected areas may be similar to unaffected areas (Bjornn et al. 1977).

Road reconstruction BMPs to reduce length of road with runoff into streams, and MgCl₂ application techniques favoring chemical penetration into the road surface will tend to limit the instream concentration of MgCl₂ and limit its effects on invertebrates to small areas near the crossings. Therefore, fine sediment deposition and dust abatement chemical effects to forage are expected to be small, localized, and temporary.

The removal of vegetation in the riparian area can reduce the amount of terrestrial habitat for insects near the stream environment. Very little riparian vegetation will be killed or removed during roadwork, culvert work, or prescribed fire activities. Following this work, bare soil areas will be revegetated. In addition, timber harvest activities will not occur in riparian areas and prescribed fire will only be allowed to back into the riparian areas. For these reasons, any effects to riparian vegetation and associated insects from the proposed action are not expected to reach levels that will adversely affect the forage PBF. The action as a whole is not expected to change the function or conservation value of the forage PBF in the action area.

2.5.2.5 *Natural Cover/Shelter*

The proposed action has the potential to affect channel and riparian indicators that contribute to natural cover/shelter. Channel indicators include pool frequency and quality, width/depth ratio, and off-channel habitat. Sediment and channel adjustments from stream crossing replacement or removal may cause short-term effects to stream cover.

Only one of the crossing replacements or removals is within 600 feet of steelhead critical habitat and all are not expected to have steelhead present. Sediment introductions from this work will be minimized through implementation of project BMPs. Sediment pulses are not expected to be of sufficient magnitude to cause geomorphic changes to the stream or fill pools and gravels. Therefore, no changes are expected to pool frequency and quality, channel width-to-depth ratios, and off-channel habitats at the local and watershed scales. Because project effects to channel structure and associated cover for steelhead from culvert work are likely to be minor and short term, the project is not expected to reduce the conservation value of the cover PBF at the local to watershed scales.

The proposed action may reduce the amount of LWD in a given location during select road activities (i.e., road reconstruction and culvert work) and when prescribed fires back into RHCAs.

Prescribed fires that back into RHCAs are expected to result in little tree mortality; however, if trees are killed, they will become more readily recruitable as LWD to streams. Arkle and Pilliod (2010) found no effect on LWD after prescribed fire (with no direct ignition in RHCAs) in a ponderosa pine forest. Road activities in RHCAs will result in limited, if any, tree removal. If trees are removed from work sites, they will be placed on the ground in the RHCA. Considering the very limited areas that will be impacted coupled with the limited amount of existing or potential future LWD that could be removed, the proposed action is expected to have a minimal effect on LWD recruitment and related instream cover/shelter in the action area. In summary, project actions are not expected to have adverse effects on the natural cover and shelter PBF in the action area.

2.5.2.6 Unobstructed Passage

The removal and/or replacement of the three culverts in or near the upstream extent of designated critical habitat will improve passage and will decrease the likelihood of culvert failure that would obstruct future passage. Because this is a long-term beneficial effect, the proposed action is expected to maintain, and slightly improve this PBF within upper Clear Creek and South Fork Clear Creek, where those culverts occur. During the replacement process, however, passage to upstream and downstream habitats will be obstructed for one day while the stream is moved to a temporary channel. Once the stream flows through the temporary channel, there will be passage. This is a short-term effect as culvert replacements on these small streams will take approximately 5 days to complete, at which point the natural channel will be rewatered and fish passage conditions restored in the natural channel. Because steelhead are not expected at these sites, this is only a potential small, short-term adverse effect to the “free of artificial obstructions” PBF. In the long term, the action will increase the function of this PBF in upper Clear Creek and South Fork Clear Creek.

2.5.2.7 Climate Change

Project actions that last more than 10 years may cause adverse effects that are amplified by climate change. Although all timber sales will be sold within 10 years, implementation of the harvest sales may extend beyond 10 years due to continued prescribed burning and decommissioning of temporary roads. Although climate change is predicted to change water temperatures, precipitation patterns, and snow runoff timing, it is the change in precipitation patterns, or an increase in rain-on-snow (ROS); Leung et al. 2004; Musselman et al. 2018) events that has the potential to amplify effects of the project. Accounting for more snow falling as rain, increased rain intensity, and reduced snow accumulation, ROS frequency may change slightly but event intensity and flooding is predicted to increase by 10 to 30 percent in the Clearwater River subbasin by the end of the century (Musselman et al. 2018). Ten years after the project begins, road obliteration and prescribed burning will continue to create bare soil areas in a mosaic of small patches. These areas have a greater chance of erosion and consequent sediment delivery than vegetated areas. An increase in the frequency of ROS would increase the risk of erosion in the bare soil areas. However, as discussed above, project-related cleared or burned areas are expected to revegetate within 1 to 2 years and PACFISH buffers would leave riparian areas vegetated and capable of filtering eroded sediment from burn areas. If eroded sediment from these patches were delivered to streams, it would likely be to a small number of streams in the action area and be transported out of the action area during the powerful high flows associated with ROS events. ROS events are unlikely to cause temporary roads to fail and deliver sediment because none are on landslide-prone or steep areas, and have no culverts or stream crossings for potential failure.

2.5.3 Summary of Effects on Steelhead and Critical Habitat

The action will have localized adverse effects on fish and critical habitat in the short term. Three culvert replacements sites, each with 600 effects zones may affect 6 juvenile steelhead. Stranding at three culvert replacement sites may kill up to three juvenile steelhead with an additional three steelhead expected to experience adverse effects from turbidity.

Steelhead spawning and rearing habitat is widely distributed in the watershed, providing some resilience with respect to disturbance in localized areas. At the three culvert replacements that will be monitored for turbidity, and 23 haul stream crossings that may receive reconditioning or reconstruction, steelhead may be present and experience small adverse effects from sedimentation of substrates. Small adverse effects from sediment would occur at the subwatershed scale during individual timber sale activity. Due to timber sales overlapping in time, lower mainstem reaches of some subwatersheds and the mainstem Clear Creek will have more protracted but attenuated minor adverse effects to spawning and rearing substrates and thus to steelhead. Culvert replacements and removals, and haul over stream crossings, in non-fish-bearing streams will not have immediate effects to steelhead but would contribute the protracted and attenuated effects to downstream substrates.

Other modes of effects from exposure to toxins, visual and noise disturbance, prescribed fire, water drafting, small ECA-related changes to streamflow (water quantity), and stream temperature changes are expected to be minor and not likely to result in harm to steelhead.

This action will result in small, temporary decreases in the condition of critical habitat PBFs within the action area in the short term, and will improve the condition of some PBFs in the long term. The action involves increased application of $MgCl_2$ salt to roads and a great deal of movement of vehicles containing fuels and other toxic chemicals through the action area creating a risk of chemical contamination of streams. Truck, equipment, and haul BMPs, and actions that will reduce road connectivity to streams will minimize the risk and amount of those effects on the water quality PBF in the action area.

Project related sediment mobilization and inputs will reduce the water quality PBF temporarily, most notably after rewatering following culvert work. Sediment inputs from road and culvert work, and from haul may also reduce stream substrate condition in areas below stream crossings and below the mouth of a small watershed with sensitive channels and high ECA from harvest unit 109. These sediment impairments would continue for the time period between implementation of the activity (culvert work, road reconstruction near streams, heavy road use at stream crossings), and the time road surfaces stabilize 1 to 2 years later. In the longer term, sediment delivery should be reduced and substrate PBF conditions improved through elimination of permanent roads, addressing existing sediment sources on roads, and applying/verifying BMPs primarily within the short sections of road that remain linked to streams. Culvert replacements should decrease the risk of future culvert failure and associated sedimentation, and impairment of fish passage conditions at the three sites proposed for turbidity monitoring. Effects on the forage, natural cover/shelter, and water quantity PBFs are expected to be very small and not likely to change the condition of those PBFs in the action area.

Climate change could increase the frequency of ROS events in the action area over the next century. Climate change is unlikely to amplify adverse effects from project actions because of the temporary and small exposure of base soil areas to ROS events. For temporary roads, the lack of exposure to the stream network, and limited number of miles at any time during the 10-year implementation period, will limit the chance of failure and sediment delivery during an ROS event.

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

The IDL tracks timber harvest on its own land as well as timber sales from private land in Idaho and the Clear Creek watershed as required by the FPA, accounting for all timbered land that is not administered by the NPCNF. Future actions include:

- Timber in the second 640-acre IDL endowment, located on the NPCNF boundary in the Clear Creek prescription watershed, is not currently proposed for harvest.
- There are approximately 200 acres of IDL land endowed to public schools in the Leitch Creek prescription watershed, and no timber harvest is currently proposed.

In July, 2014, the IDL revised timber harvesting rules under the IFPA to increase tree retention in stream buffers for fish-bearing streams (<http://www.idl.idaho.gov/forestry/fpa/shade-rule/index.html>). All future timber harvest actions under IDL jurisdiction, which include private actions, require adherence to these specifications in the IFPA. Effects from these actions may include noise exposure; water withdrawals; chemical contamination; suspended and deposited sediment; streamflow alteration (ECA); and stream temperature. Based on past patterns of non-Federal land forestry activity in the action area, it is likely that IDL and private parties will continue to complete pre-commercial thinning and commercial harvest in blocks of a few hundred acres or less in this watershed. Road maintenance and use on approximately 45 miles of paved, gravel, and native surface roads will also add suspended and deposited sediment, reduce riparian vegetation along some road sections, and contribute MgCl₂ and petroleum products to road surfaces and eventually to streams. The effects of timber and road activities managed or permitted by IDL are expected to be somewhat less than these effects in the baseline due to improved riparian conservation measures in the IFPA.

The Snake River Salmon and Steelhead Recovery Plan identifies degraded floodplain connectivity due to development and reduced flows due to surface water consumption as potential habitat limiting factors and threats to steelhead recovery (NMFS 2017). As discussed in the Environmental Baseline section, State of Idaho and private actions in the Clear Creek watershed, including residential, agricultural, and stock uses, have likely resulted in reduced riparian vegetation, unstable stream banks, increased erosion and sedimentation, some level of water nutrient and toxin load, reduced streamside cover, and reduced floodplain connectivity. NMFS assumes that future private and state activities will continue at approximately the current rates, maintaining the current factors and threats limiting steelhead recovery. NMFS is not aware of any specific future non-federal activities within the action area other than those discussed above.

Recreation activities such as camping, hunting, fishing, firewood cutting, and trail use will likely continue at approximately the same rate and may have localized adverse effects on riparian vegetation, streambank stability, and cause delivery of sediment and petroleum products from some sites. There does not appear to be substantial angling pressure in the action area nor does NMFS anticipate this will change in the future. The area is not open for sport angling of adult salmon and steelhead. NMFS anticipates that angling of juvenile steelhead may occur at current rates; however, angling in this area appears to be limited, based on limited use of trails and access points along the stream (e.g., in areas with pools).

2.7 Integration and Synthesis

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

Based on information available for the 2022 viability assessment, none of the five MPGs of SRB steelhead are meeting their recovery plan objectives and the viability of many populations remains uncertain. The recent, sharp declines in abundance are of concern and are expected to negatively affect productivity in the coming years. Overall, available information suggests that SRB steelhead continue to be at a moderate risk of extinction within the next 100 years. This DPS and its critical habitat continue to face threats from human land use practices; mainstem, tributary, and floodplain habitat loss, degradation, or modification; decreased water quality; predation; harvest; hatcheries; and climate change. The Lower Mainstem Clearwater steelhead population is currently highly viable and meeting its VSP target criteria of low risk viability status for recovery.

The action area is the Clear Creek watershed and is one of six major spawning areas for the Lower Mainstem Clearwater River population with occupied designated critical habitat throughout. Steelhead spawning and rearing occurs throughout the Clear Creek watershed; however, during summer suboptimal warm water temperatures limit juvenile rearing in the lower watershed below the Forest boundary.

Baseline fine sediment in substrates is higher than for undisturbed watersheds in the ecoregion and represent impaired conditions for steelhead spawning and rearing. Heavy timber harvest on Forest land in the upper watershed is at least 22 years old with canopy, ground cover, and root strength essentially fully recovered. These three factors are unlikely to be exacerbating ROS events, soil erosion, or landslide risk that can lead to sediment delivery to streams. Harvest on all other lands is light and unlikely to have significant consequences for the same three factors in the watershed. Large wood and pools are below PACFISH RMOs and may be smaller contributors to, or a sign of, excess sedimentation in substrates. Chronically elevated fine sediments in Forest streams is likely due to the existing road system which was modeled to be contributing 64 percent more sediment than for undisturbed conditions.

The timeframe for implementing the proposed action will occur while climate change-related effects are expected to become more evident in this and other watersheds within the range of the SRB steelhead DPS. Climate change could increase the frequency of ROS events in the action area. Climate change is unlikely to amplify adverse effects from project actions because of the temporary and small exposure of bare soil areas to ROS events. For temporary roads, the lack of exposure to the stream network, and limited number of miles at any time during the 10-year implementation period, will limit the chance of failure and sediment delivery during an ROS event.

As noted in the effects section (Section 2.5), implementation of the proposed action and BMPs will affect SRB steelhead and designated critical habitat in several ways:

- Juvenile steelhead within approximately 600 feet downstream of the three culvert work sites in streams known or assumed to have steelhead⁵ are likely to be stranded, displaced, or experience temporary reductions in foraging efficiency and/or predator avoidance due to suspended and deposited sediment. NMFS estimates that three juvenile steelhead will die from stranding during dewatering of work areas, and three juvenile steelhead will have minor behavioral and physiological responses to sediment produced during culvert removal and replacement activities.
- Due to existing and proposed cross drains, only 5.2 percent of the haul-road miles will drain water and sediment to stream crossings in fish- and non-fish-bearing streams. Because of the general headwater or ridgetop locations of haul routes, only 1.4 percent of haul road miles drain to fish-bearing streams.
- New ground disturbance and heavy use of roads during project implementation are expected to increase fine sediment delivery at stream crossings and downstream substrates, and cause harm to steelhead, in the short term. There are 239 stream crossings in the action area, eight of which are paved. There will be some level of maintenance, haul, and/or ground disturbance near or over 231 unpaved stream crossings, 216 of which are over non-fish-bearing streams in headwater areas away from steelhead and critical habitat. Twenty-three are over fish-bearing streams, eight of which are paved with little expected sediment delivery, and of the remaining 15, only one is within 600 feet of critical habitat. Increased sediment delivery at stream crossings will continue for a period of 1 to 4 years following

⁵ As noted earlier in the document, the three sites are assumed to have steelhead because there are no passage barriers below these sites.

road upgrades or until active haul ceases, whichever is greater. During this active period road upgrades and cross drains will minimize the road length draining to crossings, and PED monitoring will minimize damage to road drainage structures.

- In the short term, after a pulse of sediment from road work, the reduced road length, larger culverts, and graveling will reduce delivery when compared to baseline; however, sediment delivery due to haul will reduce a small portion of these gains. In the long term, road and drainage improvements, and road decommissioning are expected to reduce fine sediment delivery from roads when compared to baseline.
- Initial deposition of sediment from crossings will be within 600 feet downstream from crossings. Beyond 600 feet, effects will be delayed and attenuated depending on distance downstream from crossings.
- For timber harvest, the use of PACFISH buffers, exclusion of landslide prone areas from harvest, and other measures to avoid creating channelized flow to streams are expected to minimize any fine sediment delivered to streams to immeasurable levels.
- The NPCNF and NMFS analyses show that a peak flow response from ECA for third to fifth order streams in the Clear Creek watershed would be unlikely or undetectable, unlikely to scour, and unlikely to cause adverse effects to substrate and steelhead. In South Fork Clear Creek, the 2015 Baldy Fire burn area, in combination with proposed harvest, did not increase ECAs to levels associated with detectable increase in peak flow. At the finer scale of first and second order headwater streams, streams in the area containing harvest unit 109 were identified as being at risk for scour from higher ECA and potential increases in peak flows. Potential scour from these channels may cause an increase in sediment delivery and deposition in downstream substrates resulting in short-term, minor adverse effects to spawning and rearing steelhead, and critical habitat.
- Prescribed fire treatments, dust abatement chemicals, equipment/truck leaks, spills of fuels, water withdrawals, temporary fish passage obstructions, vegetation removals at near-stream work sites, and construction/haul noise all have the potential to adversely affect steelhead and critical habitat. However, the NPCNF will employ numerous precautionary measures/BMPs that NMFS expects will reduce the occurrence of those effects and limit the effects to those that will not harm steelhead.
- Fine sediment levels throughout the action area are elevated. The proposed action will add dispersed short-term pulses during project implementation but will reduce long-term chronic sediment delivery. Road work, in preparation for haul, will add short-term pulses of sediment with localized accumulations below stream crossings. However, during project implementation and after haul for a given timber sale is complete, road improvements are expected to reduce sediment inputs in these sale areas when compared to baseline. In addition, harvest unit 109 has been identified as a risk for channel erosion and sediment delivery with possible harm to steelhead. Over time, localized accumulations of sediment will move downstream in successive high-water periods creating a small attenuated but constant effect on downstream substrates in critical habitat. Because of improvements to the

road network and road decommissioning, chronic sediment delivery from the road network is expected to decrease post project compared to the baseline.

Available information on cumulative effects indicates that ongoing private and state timber harvest-related activities, private land development, grazing, water use, and recreation in the Clear Creek watershed are expected to continue at approximately the same level. NMFS assumes the effects from these activities in combination with the existing channelization of LCC will continue to limit habitat function for steelhead migration, rearing, and spawning in Clear Creek downstream of the NPCNF boundary at a level similar to what currently exists.

As noted above, the effects of the action involve both short-term increases in sediment delivery from site specific culvert work and haul and long-term reductions in sediment delivery from road improvements. During the 20-year implementation period, road improvements, recent and ongoing road decommissioning, and haul will be occurring at the same time and deliver sediment at stream crossings. These positive and negative effects for steelhead habitat and steelhead appear to be distributed fairly evenly in time through the 20-year period as the sequential road work and timber harvest is implemented. There will be spatial variations in the effects, as the main areas of harvest and log-haul move from subwatershed to subwatershed with the timber sales occurring one after another. Even in the areas of the most activity in a particular year, the negative effects of increased sedimentation are expected to be localized (e.g. to a few hundred feet below stream crossings), mostly occurring on streams that do not have steelhead, and of small magnitude because of the PACFISH buffers for harvest activities and various road BMPs that can be very effective in eliminating and minimizing sediment inputs and monitoring to ensure that they are.

The proposed action is expected to have short-term minor effects on steelhead critical habitat condition in Clear Creek over the life of the project. During and after the project, the project road work will likely combine with other work underway in the watershed to decrease sediment delivery from roads and eventually help reduce fine sediment levels in the stream substrate. The Proposed ESA Recovery Plan for Snake River Idaho Spring/Summer Chinook Salmon and Steelhead Populations (NMFS 2017) has noted that substrate sedimentation is one of the primary limiting factors to tributary habitat production for the Lower Clearwater Mainstem steelhead population, of which the steelhead in Clear Creek are a part. The proposed action's effects, as limited by various BMPs, are not expected to appreciably increase fine sediment in the short term, and should reduce fine sediment in the long term, in the Clear Creek major spawning area (one of six major spawning areas for this population). The action, therefore, is not expected to appreciably reduce habitat function and steelhead production substantially for this population in the short term, and may, to a small degree, improve steelhead habitat and production for this population in the long term. Those minor effects within the population will not hinder its current highly viable, very low risk status as recommended (viable or highly viable) in the Recovery Plan for the Clearwater Basin MPG to achieve viable status. Viability of the Clearwater Basin MPG is a necessary component for the recovery of the SRB steelhead DPS.

The number of juvenile steelhead estimated to be killed or injured in the course of this action will not be large enough to influence the number of adult fish returning to the action area. Considering these potential effects of the proposed action along with the status of the species, baseline condition, potential effects of climate change, and cumulative effects in the action area, NMFS concludes that

any realized mortality should not appreciably reduce the likelihood of the survival and recovery of SRB steelhead.

Considering the potential effects of the proposed action with the status of critical habitat, baseline condition, potential effects of climate change, and cumulative effects in the action area, NMFS concludes that the proposed action is not expected to appreciably reduce the conservation value of critical habitat in the short term, and may increase the long-term conservation value of critical habitat in the Clear Creek watershed.

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, the effects of other activities caused by the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SRB steelhead, or destroy or adversely modify their designated critical habitat.

2.9 Incidental Take Statement

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

2.9.1 Amount or Extent of Take

In the opinion, NMFS determined that incidental take is reasonably certain to occur as follows: (1) Recent, and historical surveys indicate ESA-listed species are known to occur in the action area; (2) the proposed action involves construction and maintenance activities on roads and heavy use of roads within RHCAs that could result in sediment delivery to streams; and (3) the proposed action includes instream work activities that could harm or kill juvenile steelhead (e.g., dewatering, rewatering/turbidity). In some instances, NMFS is able to quantify the amount of take; however, where available information precludes our ability to quantify take, we use surrogates to describe the incidental take pursuant to 50 CFR 402.14.

In the biological opinion, NMFS determined that incidental take would occur as follows:

- (1) Mortality of juvenile steelhead during channel dewatering for culvert replacements;
- (2) Harm of juvenile steelhead as a result of temporary turbidity plumes associated with construction activities for culvert replacements;
- (3) Harm of juvenile steelhead from sedimentation of substrate below stream crossings associated with culvert removals and replacements, and with road reconstruction and use near streams;
- (4) Harm of juvenile steelhead from ECA-related sedimentation of substrate below first and second order streams adjacent to harvest unit 109.

Incidental Take from Channel Dewatering

As described in the species effects analysis, NMFS was able to quantify the take associated with the three culvert replacements that are most likely to have steelhead present (i.e., take from channel dewatering and turbidity plumes). NMFS estimated a total number of six steelhead may experience adverse effects if steelhead are present at any of these three culvert replacement sites. Of the six, three juvenile steelhead may be killed from stranding during channel dewatering. Therefore, NMFS will consider the extent of take exceeded if more than three juvenile steelhead in total are found dead within the dewatered areas of the three culvert replacements.

Incidental Take from Turbidity Plume

NMFS estimated that up to three juvenile steelhead could be temporarily displaced by, or harmed through exposure, to elevated turbidity levels resulting from instream work at the three culvert replacements (three of six present die from stranding). Because it is not feasible to observe fish fleeing the area or assess physiological effects on fish that don't flee and remain exposed, NMFS will use the extent and duration of the turbidity plumes as a surrogate for take. Because turbidity is the direct cause of take of steelhead, and it is known what levels of turbidity cause adverse effects to steelhead, monitoring turbidity is an excellent surrogate for this take pathway. NMFS will consider the extent of take exceeded if visible turbidity plumes at any of the three monitored culvert replacements extends beyond 600 feet downstream.

Incidental Take from Sedimentation of Substrate

Similarly, it is likely that there will be increased levels of deposited sediment below stream crossings, and attenuated increases farther downstream, associated with culvert work, road reconstruction, or heavy road use. However, it is the failure of the stream crossings over fish-bearing streams that has the potential for immediate adverse effects to steelhead. Crossing failures over non-fish-bearing streams would contribute unexpectedly high levels of fine sediment in substrates downstream in occupied habitat. However, due to the extremely high variability that occurs when measuring deposited sediment in stream substrates (Leonard 1995), it is not practicable to assess changes in deposited sediment through direct measurements. The type of sampling design

and number of samples required to detect a statistically significant change would be prohibitive. In addition, take cannot be quantified because steelhead presence and density is highly variable due to natural factors such as seasonal water temperature, flow, or channel conditions. For this reason, NMFS will use the condition of the road at the stream crossings as a surrogate for take from sedimentation of substrate. Road condition is a reasonable surrogate for take because of the causal relationship between disrepair of roads and consequent sediment delivery to streams and substrate. Because road surface and drainage condition affect the amount of erosion and fine sediment delivery from the road to stream substrates, and excess fine sediment in substrates can cause harm to steelhead, monitoring road surface and drainage conditions is a reasonable surrogate for this take pathway. The NPCNF monitors the road surface and drainage condition while administering timber sales and uses PED (potential ecological damage) as a threshold for any deterioration of the road surface or drainage in need of mechanical repair. The PED develops after significant precipitation events. Because of the potential for erosion and sedimentation of substrates downstream from roads segments exhibiting PED, it is important that PED be identified and repaired as quickly as possible after PED develops.

NMFS will consider the extent of take to be exceeded if PED meets any of these conditions:

- (1) PED is present at 25 percent or more of the stream crossings on active haul routes within 2 days of roads becoming drivable (i.e., a Sales Administrator's vehicle);
- (2) PED is present at 25 percent or more of the fish-bearing stream crossings on active haul routes within 2 days of roads becoming drivable (i.e., a Sales Administrator's vehicle); or
- (3) PED on active haul routes is not corrected within 6 days after roads become drivable for cars.

NMFS uses 25 percent PED as a threshold of take not to be equaled or exceeded because it would represent (on average) the need for mechanized repairs at a quarter or more of active haul crossings of fish-bearing streams and a more-than-infrequent occurrence of effects on non-fish bearing streams that could be sources of eventual sediment movement into areas with steelhead. Effects in excess of that percentage would seem to indicate a prevalence of design/maintenance execution problems and/or rain events that were more intense than the planned designs and maintenance withstood effectively. Although these effects would be addressed quickly under the action, their temporary presence could indicate future erosion issues and a greater source of sediment delivery at these crossings, and more take in the stream reaches below the crossings, than NMFS anticipated.

Incidental Take from ECA-related sedimentation of substrate

As described in the effects discussion, changes in ECA may have adverse effects on steelhead and critical habitat through peak flow increases causing erosion/sediment delivery from one small watershed. If these adverse effects occur, they will be sources of take of steelhead. The additional amounts of sediment associated with harvest-induced peak flow increases from channels in the watershed cannot be quantified because there are many uncontrolled environmental variables (such as precipitation and peak flow quantity) that affect the outcome. For these reasons, the effects of that sediment on steelhead growth, survival, and reproductive success also cannot be quantified as a

number of steelhead killed or harmed. Therefore, NMFS will use the regeneration harvest acreage (percent of watershed area) itself as the surrogate for take. Regeneration harvest acres is a reasonable surrogate for take because of its causal relationship to take, which is that regeneration harvest removes canopy cover, reductions in canopy cover can cause increases in peak stream flow which can cause stream channel scour and sedimentation of downstream substrates, and sedimentation of substrates can cause harm to steelhead. Take will be exceeded if regeneration harvest in the watershed containing harvest unit 109 exceeds the proposed regeneration harvest area of 130 acres. The area for this watershed will be delineated from its drain point at its confluence with Clear Creek. Prior to harvest, if the NPCNF finds it necessary to plan to exceed 130 acres of regeneration harvest for this watershed the NPCNF will reinitiate consultation. Although this surrogate could be considered coextensive with the proposed action, monitoring and reporting requirements will provide opportunities to check throughout the course of the proposed action whether the surrogates are exceeded. For this reason, the surrogate functions as an effective reinitiation trigger.

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

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

The NPCNF and COE (for those measures relevant to the Clean Water Act [CWA] section 404 permit) shall comply with the following RPMs:

1. Minimize the potential for incidental take from road preparation and culvert replacements, haul, and harvest.
2. Ensure completion of a monitoring and reporting program to confirm that the terms and conditions in this ITS were effective in avoiding and minimizing incidental take from permitted activities and ensuring amount/extent of incidental take defined herein is not exceeded.

2.9.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The NPCNF and COE, or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

- 1) To implement RPM 1, the NPCNF and COE (for those measures relevant to the CWA section 404 permit) shall ensure that:
 - a) The creation of channelized flow through harvest activities (i.e. skid trails, yarding activities, land construction and design) is avoided.
 - b) NMFS is contacted within 48 hours of any project log truck accident that occurs within 50 feet of moving water or is leaking fuels or other toxic chemicals into streams.
- 2) To implement RPM 2 (monitoring and reporting), the NPCNF and COE (as relevant to the CWA section 404 permit) shall ensure that:
 - a) All steelhead injured or killed shall be identified, counted, and recorded. These data will be reported in the annual project report.
 - b) If project take of steelhead (total of three fish) from stranding is exceeded at the three culvert sites, work will be suspended and NMFS will be called to discuss reinitiation of consultation.
 - c) Turbidity monitoring shall be conducted for the three stream crossings proposed for turbidity monitoring. Turbidity at the downstream sample location shall be recorded until the plume is no longer visible at 600 feet or less downstream. Monitoring of NTUs, time and distance of measurements, and maximum extent of turbidity will be reported in the project annual report.
 - d) The NPCNF shall inspect all active haul road drainage systems for signs of PED within two working days of roads becoming drivable (i.e., a Sales Administrator's vehicle) following a precipitation event. Within the two working days of inspection, the NPCNF will also notify and direct the responsible purchaser to correct the cause of the PED condition within four days following notification. The NPCNF will keep a log of identified PEDs and of NPCNF and contractor compliance with the corrective 4-day time frame. Logged PED will be submitted in the Project annual report. Further details of this monitoring can be found in Sections 1.3.3 and 2.9.1.
 - e) The Forest Service shall not plan, or implement cutting of, more than 130 acres of regeneration harvest in the watershed containing harvest unit 109 (i.e., this watershed may have multiple regeneration harvest units). The watershed containing unit 109 has a drain point with coordinates latitude 46.0589, longitude -115.7487. NMFS will provide the NPCNF the watershed delineation file of the watershed so the NPCNF can verify that the planned regeneration harvest does not exceed 130 acres. After layout and prior to harvest, if the NPCNF finds it necessary to plan to exceed 130 acres of regeneration harvest for this watershed, the NPCNF will reinitiate consultation. The NPCNF will report the final layout acreage for regeneration harvest in the annual report for the year that work is completed in the watershed.

- f) If the extent of take described above (for steelhead mortality, turbidity, harvest, or PEDs) is exceeded, the NPCNF shall cease take-causing activities and contact NMFS within 72 hours.
- g) Post-project reports summarizing the results of all monitoring shall be submitted to NMFS by December 31 annually. The annual project reports shall also include a statement on whether all the terms and conditions of this opinion were successfully implemented.
- h) The post-project reports shall be submitted electronically to: nmfswcr.srbo@noaa.gov.
- i) NOTICE: If a steelhead or salmon becomes sick, injured, or killed as a result of project-related activities, and if the fish would not benefit from rescue, the finder should leave the fish alone, make note of any circumstances likely causing the death or injury, location and number of fish involved, and take photographs, if possible. If the fish in question appears capable of recovering if rescued, photograph the fish (if possible), transport the fish to a suitable location, and record the information described above. Adult fish should generally not be disturbed unless circumstances arise where an adult fish is obviously injured or killed by proposed activities, or some unnatural cause. The finder must contact NMFS Law Enforcement at (206) 526-6133 as soon as possible. The finder may be asked to carry out instructions provided by Law Enforcement to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved.

2.10 Conservation Recommendations

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

1. Include a hydrologist, biologist, or soil scientist as a participant in PED monitoring to better identify potential sources of sediment delivery from roads.
2. To mitigate the effects of climate change on ESA-listed salmonids, the NPCNF and COE should follow recommendations by the ISAB (2007) to plan now for future climate conditions by implementing protective tributary, mainstem, and estuarine habitat measures; as well as protective hydropower mitigation measures. In particular, implement measures to protect or restore riparian buffers, wetlands, and floodplains; remove stream barriers; and late summer and fall tributary streamflows.
3. To increase the scope of cross drain sediment monitoring, the NPCNF should consider adding the 1106 Road to their cross drain monitoring. Specifically, the NPCNF could monitor each cross drain on the 1106 Road that is immediately upstream of each stream crossing within the South Fork Clearwater watershed and on Forest Service land. The cross

drains would best be monitored prior to haul on this road and thereafter at the same frequency as the proposed cross drain monitoring.

Please notify NMFS if the NPCNF or COE, or another entity, carries out these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit listed species or their designated critical habitats.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Clear Creek Integrated Restoration Project.

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

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

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

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

3.1 Essential Fish Habitat Affected by the Project

The action area, as described in Section 2.3 of the above opinion, except for areas above natural barriers to fish passage, is also EFH for Chinook salmon (PFMC 2014) and for coho salmon (Amendment 18). The Pacific Fishery Management Council designated the following five habitat types as habitat areas of particular concern (HAPCs) for salmon: complex channel and floodplain habitat, spawning habitat, thermal refugia, estuaries, and submerged aquatic vegetation (PFMC 2014). The proposed action may adversely affect the following HAPCs: Pacific Coast Salmon.

3.2 Adverse Effects on Essential Fish Habitat

Based on the information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that the proposed action will have the following adverse effects on EFH designated for Chinook and coho salmon: (1) Increased sediment temporarily affecting water quality and substrate in some areas; and (2) temporary disruption of juvenile migration and rearing activities while three culvert replacement work areas are temporarily dewatered.

3.3 Essential Fish Habitat Conservation Recommendations

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

- 1) Install cross drains to reduce sediment delivery at stream crossings. Evidence of these opportunities would be long steep road ditches, or sluffing cut slopes, draining to stream crossings.
- 2) NMFS is contacted within 48 hours of any Project log truck accident that occurs within 50 feet of moving water or is leaking fuels or other toxic chemicals into streams.
- 3) Sediment sources on reconstructed roads and haul routes would be addressed and eliminated or minimized prior to log haul activities for each of the planned timber sales.
- 4) NMFS fish screen criteria (NMFS 2022b) will be utilized for all water pumping activities. A qualified fisheries biologist shall inspect all pumping locations. Water pumping will not decrease flow or water surface elevation by more than 10 percent.
- 5) All motorized equipment and vehicles used in or near the stream or riparian areas are cleaned of external oil, dirt, and mud; and repair leaks prior to arriving at the project site.
- 6) The creation of channelized flow through harvest activities (i.e. skid trails, yarding activities, land construction and design) is avoided.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the NPCNF and COE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation

Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

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

3.5 Supplemental Consultation

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

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the NPCNF and COE. Individual copies of this opinion were provided to the NPCNF and COE. The document will be available within 2 weeks at the NOAA Library Institutional Repository (<https://repository.library.noaa.gov/welcome>). The format and naming adhere to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan.

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including 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/EFH consultation contain more background on information sources and quality.

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

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

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