BIOLOGICAL ASSESSMENT / BIOLOGICAL EVALUATION

FOR

THREATENED, ENDANGERED, PROPOSED, AND SENSITIVE FISH SPECIES THAT MAY BE AFFECTED

BY THE

EDDY GULCH LATE-SUCCESSIONAL RESERVE FUELS / HABITAT PROTECTION PROJECT

Salmon River and Scott River Ranger Districts
Klamath National Forest

April 16, 2009

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Reviewed by: Julie Perrochet 4-17 09
Julie Perrochet — Date

Approved by: 4-20-09
Ray Haupt, District Ranger, Salmon River and Scott River Ranger Districts — Date

PROJECT NAME:	Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project (Eddy Gulch LSR Project)
ADMINISTRATIVE UNIT:	Klamath National Forest, Salmon River and Scott River Ranger Districts
FOURTH FIELD WATERSHED:	Middle Klamath River
FIFTH FIELD WATERSHEDS:	North Fork Salmon River South Fork Salmon River South Fork Scott-French River
SEVENTH FIELD WATERSHEDS:	Black Bear Creek Cody-Jennings Creek Crawford Creek Eddy Gulch Gooey-Ketchum Creek Gould-East Fork South Fork Salmon River Indian Creek Lower North Russian Creek Lower South Russian Creek Matthews Creek Shadow Creek Sixmile Creek Tanner-Jessups Creek Taylor Creek Timber-French Creek Upper North Russian Creek Whites Gulch Kanaka-Olsen Creek Robinson-Rattlesnake Creek Upper Etna Creek
WATERSHED ANALYSES:	Main Salmon Ecosystem Analysis (USDA Forest Service 1995c); North Fork Watershed Analysis (USDA Forest Service 1995d); Lower South Fork of the Salmon River Ecosystem Analysis (USDA Forest Service 1997a); Upper South Fork of the Salmon River Ecosystem Analysis (USDA Forest Service 1994b); Callahan Ecosystem Analysis (USDA Forest Service 1997b); Lower Scott Ecosystem Analysis (USDA Forest Service 2000b); Canyon Ecosystem Analysis (USDA Forest Service 1994a); Beaver Creek Ecosystem Analysis (USDA Forest Service 1996); Salmon River Subbasin Restoration Strategy: Steps to Recovery and Conservation of Aquatic Resources (USDA-FS 2002b).
NEPA DOCUMENTATION:	Eddy Gulch LSR Fuels / Habitat Protection Project Draft Environmental Impact Statement (draft EIS, in progress).
ESA SPECIES CONSIDERED:	Southern Oregon / Northern California Coast coho salmon Evolutionarily Significant Unit

ESA CRITICAL HABITAT CONSIDERED:	Southern Oregon / Northern California Coast coho salmon Critical Habitat
ESA DETERMINATIONS:	May Affect but is Not Likely to Adversely Affect Southern Oregon / Northern California Coast coho salmon and its designated Critical Habitat
SENSITIVE SPECIES CONSIDERED:	• Upper Klamath-Trinity Rivers Chinook salmon (Chinook salmon) • Klamath Mountains Province steelhead trout (steelhead trout)
SENSITIVE SPECIES DETERMINATIONS:	The Eddy Gulch LSR Project is not likely to result in a trend toward listing or loss of viability of steelhead trout or Chinook salmon in the short term and will have beneficial effects to habitat conditions in the long term through reduced risk of uncharacteristic wildfires and improved conditions (increased resistance to stand-replacing fire) in the Riparian Reserves.
ESSENTIAL FISH HABITAT:	The project will not adversely affect Chinook or coho salmon essential fish habitat
LIST OF APPENDICES:	Appendix A: Klamath National Forest Matrix: Table of Population and Habitat Indicators for Use on the Klamath National Forest in the Northwest Forest Plan Area Appendix B: Tables/Checklists for Documenting the Environmental Baseline and Effects of Project(s) on Relevant Indicators for the Project Appendix C: Project Map, Drafting Sites, Critical Habitat / Essential Fish Habitat Map Appendix D: Resource Protection Measures for the Eddy Gulch LSR Project Appendix E: Project Activities Near or Within Riparian Reserves Appendix F: Pacific Salmonid Life History, Status, and Biological Requirements Appendix G: Cumulative Watershed Effects Analysis Appendix H: Tiering Forms for the Eddy Gulch LSR Project Appendix I: Road Miles / Road Density Information

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Fuels / Habitat Protection Project
April 16, 2009

I. Introduction

The purpose of this biological assessment/ biological evaluation (BA/BE) is to determine effects of the Klamath National Forest's (KNF) Eddy Gulch LSR Project on anadromous fish species listed under the *Endangered Species Act* (ESA) as Threatened, on designated critical habitat for coho salmon, and on species listed as "Sensitive" by the Pacific Southwest Region of the United States Department of Agriculture (USDA) Forest Service.

The proposed project activities are located in the Salmon River Analysis Area on the KNF, within the Klamath River basin, California. The 5th-field and 7th-field watershed names and hydrologic unit codes (HUC) where project activities would occur are shown in Table 1.

TABLE 1. Eddy Gulch LSR 5th- and 7th-field watersheds and hydrologic unit codes.

Watershed	HUC
North Fork Salmon River (5th field)	1801021002
South Fork Salmon River (5th field)	1801021001
Black Bear Creek	18010210010604
Cody-Jennings Creek	18010210010602
Crawford Creek	18010210010502
Eddy Gulch	18010210020603
Gooey-Ketchum Creek	18010210010307
Gould-East Fork South Fork Salmon River	18010210010305
Indian Creek	18010210010605
Kanaka-Olsen Creek	18010210020801
Lower North Russian Creek	18010210020403
Lower South Russian Creek	18010210020503
Matthews Creek	18010210010603
Robinson-Rattlesnake Creek	18010210020602
Shadow Creek	18010210010306
Sixmile Creek	18010210010304
Tanner-Jessups Creek	18010210020604
Taylor Creek	18010210020402
Timber-French Creek	18010210010504
Upper North Russian Creek	18010210020401
Whites Gulch	18010210020601
Upper Etna Creek	18010208020602

This BA/BE has been prepared in accordance with legal requirements set forth under Section 7 of the ESA of 1973, as amended (16 United States Code [USC] 1531 et. seq.; 50 Code of Federal Regulations [CFR] 402), Essential Fish Habitat consultation under 305(b)(4)(A) of the *Magnuson-Stevens Fishery Conservation and Management Act*; and is consistent with standards established in Forest Service Manual direction (FSM 2672.42; USDA Forest Service 1991). The ESA fish species list for this BA/BE was obtained online at http://www.nwr.noaa.gov/ESA-Salmon-Listings/upload/snapshot0208.pdf, and the Sensitive species list is from the USDA Pacific Southwest Region Sensitive Species List (USDA Forest Service 1998). This BA/BE analyzes effects on the following Evolutionary Significant Units, designated critical habitat, and Essential Fish Habitat of anadromous fish:

Endangered:	None
Threatened:	Southern Oregon / Northern California Coast (SONCC) Evolutionary Significant Unit coho salmon (*Oncorhynchus kisutch*) and their designated critical habitat
Proposed:	None
Sensitive:	Upper Klamath-Trinity Rivers Chinook salmon (*O. tshawytscha*) Klamath Mountains Province steelhead trout (*O. mykiss*)
Essential Fish Habitat:	Coho salmon and Chinook salmon (specifically SONCC coho salmon and Upper Klamath-Trinity Chinook salmon for this project)

Terms

Eddy Gulch LSR. The entire 61,900-acre LSR.

Assessment Area. The 37,239-acre portion of the Eddy Gulch LSR west of Etna Summit where various treatments are proposed. All roadless areas that occur in the LSR were excluded from planning efforts and are therefore not part of the Assessment Area.

Treatment Unit. The acres proposed for some type of on-the-ground treatment under a particular alternative.

Action Area. The Action Area is defined (for ESA purposes) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved action" (50 CFR 402). The Action Area for this BA/BE includes 7th-field watersheds where Project Elements would occur, plus anadromous fish habitat downstream of where Project Elements would occur, to the point where streams meet the mainstem of the Salmon River. The environmental impact statement for the Eddy Gulch LSR Project refers to this area as the "Analysis Area."

Project Elements. For ESA purposes, refers to the various *types* of proposed fuel reduction treatments (and related activities) in the Eddy Gulch LSR Project Assessment Area. See the section below titled, "Primary Project Elements of the Proposed Action."

Supporting documents to this BA/BE are located in the following appendices:

- Appendix A: Klamath National Forest Matrix: Table of Population and Habitat Indicators for Use on the Klamath National Forest in the Northwest Forest Plan Area

- Appendix B: Tables/Checklists for Documenting the Environmental Baseline and Effects of Project(s) on Relevant Indicators for the Project
- Appendix C: Project Maps, Drafting Sites, and Salmonid Habitat Distribution Map for the Eddy Gulch LSR Project Assessment Area
- Appendix D: Resource Protection Measures for the Eddy Gulch LSR Project
- Appendix E: Project Activities Near or Within Riparian Reserves
- Appendix F: Pacific Salmonid Life History, Status, and Biological Requirements
- Appendix G: Cumulative Watershed Effects Analysis
- Appendix H: Tiering Forms for the Eddy Gulch LSR Project
- Appendix I: Road Miles / Road Density Information

II. Consultation to Date

The Eddy Gulch LSR Project is consistent with the March 19, 2004, Biological Opinion (USDC NMFS 2004a) issued by National Marine Fisheries Service (NOAA-Fisheries or NMFS) for the KNF's Land and Resource Management Plan (LRMP) (USDA Forest Service 1995a). The March 19, 2004, BO does not authorize any incidental take of listed species, and an incidental take statement is not included. Individual land management actions, groups of actions, and programmatic actions are to be consulted upon subsequently using appropriate analytical methods, in accordance with the procedures established in the Interagency Cooperation regulations for implementing Section 7 of the ESA (50 CFR 402), as well as interagency agreements and guidance on streamlining consultation with the action agencies.

The March 19, 2004, BO further states that effects on salmonids at the site scale will be analyzed in future project-level Section 7 consultations. To fulfill obligations under section 7(a)(2) of the ESA for individual or groups of projects, and to be exempt from Section 9 take prohibitions, the administrative units may use the interagency consultation streamlining guidance (1999) or subsequent updated procedures, such as the December 2003 Counterpart Regulations, to avoid jeopardizing the continued existence of listed salmonids. Interagency Level 1 teams evaluate the effects of proposed actions against the environmental baseline at project and watershed scales.

A new Analytical Process (USDA-USDOC-USDI 2004) was established on November 5, 2004, for timber sales that "may affect" listed salmonid species within the Northwest Forest Plan area to address lawsuits and rendered decisions. The KNF followed this new Analytical Process to assess effects of the project in this BA/BE.

The Analytical Process replaces the 1996 Matrix of Pathways and Indicators (NMFS 1996) with a "Tables of Population and Habitat Indicators for Use in the Northwest Forest Plan Area." The table describes the Primary Constituent Elements of critical habitat for coho salmon, as well as the important elements necessary for analysis of habitat for steelhead trout, Chinook salmon, and Essential Fish Habitat. The table provides values and ranges of conditions of indicators to determine whether baseline conditions are "Properly Functioning," "At Risk," or "Not Properly Functioning." In project-level analyses, these values and range of conditions described the range of variability for

anadromous fish habitat. As noted in the table in Appendix C of the Analytical Process, the range of criteria presented in the Analytical Process is not absolute and may be adjusted for local watersheds given supportive documentation. The KNF-NMFS Level 1 team adjusted the Matrix of Pathways and Indicators over the last few years, and the table was refined again in October 2005 to reflect local geologic and climatic influences on aquatic habitat and watershed conditions within the Klamath River Basin physiographic area (see Appendix A). The adjustments for the mid-Klamath River region (within the KNF boundaries) use values from streams that are considered pristine and supported by the environmental impact statement for the KNF LRMP data to determine "Properly Functioning" indicator conditions for anadromous streams on the KNF. Values were also estimated for "At Risk" and "Not Properly Functioning" indicator conditions. In some cases, a stream's morphology, aspect, or size may not support "Properly Functioning" criteria values for one or more habitat indicators. If an indicator for a particular stream is determined by the project fisheries biologist to be functioning at its capability (due to morphology, aspect, or size), it is rated as "Properly Functioning" even if it does not meet criteria values in the table. Appendix B in this BA/BE summarizes the baseline conditions and effects of the project described below in Section V.

On September 24, 2007, Donald Flickinger, NMFS Level 1 representative, attended a full Interdisciplinary Team (ID team) meeting in Yreka, California, and on June 3, July 1, and August 14, 2008, attended field trips to review the Assessment Area, to better understand baseline conditions in the Assessment Area, and to determine the probable effects of the project. During this period the KNF/NMFS Level 1 team discussed the proposed project to review locations of actions relative to SONCC coho salmon habitat, potential effects of the proposed actions, and to include appropriate measures to minimize adverse effects on SONCC coho salmon and its critical habitat. NMFS and KNF staff conducted unit- / site-level reviews of proposed activities in the 7th-field watersheds to determine the potential risks to anadromous fish and their habitat. During the site visit on June 3, 2008, NMFS reviewed the northwestern and western parts of the Assessment Area with the KNF and stakeholders (field review hosted by Salmon River Restoration Council), specifically to review roadside treatment areas and Riparian Reserves. During the August 14, 2008, site visit, the NMFS and ID team fisheries biologist focused their review on Riparian Reserves in the Assessment Area, including a field review of treatment units in the Shadow Creek watershed, Sixmile Creek watershed, Campbell Springs area, Black Bear Creek watershed, Music Creek watershed, and other areas in the north part of the Assessment Area. Throughout the early coordination and consultation with NMFS, the ID team fisheries biologist discussed, with NMFS, the potential effects determinations for the BA/BE and existing guidance that would pertain to the project to minimize effects on aquatic species. That existing guidance is the programmatic pre-commercial thinning and fuel hazard reduction BA (USDA Forest Service 2001b) and Klamath National Forest Hazard Tree Policy—Safety Provisions on National Forest System Roads (USDA Forest Service 2005a), as well as the potential for this Project BA/BE to tier to the KNF's *Biological Assessment and Evaluation for Pre-commercial Thin and Release Actions and Fuel Hazard Reduction Actions* (USDA Forest Service 2001b). During the field visit on August 14, 2008, NMFS staff preliminarily concurred that proposed activities were not likely to adversely affect SONCC coho salmon and their critical habitat, and that the fuels reduction actions could tier to the KNF programmatic BA (USDA Forest Service 2001b) if guidelines in that programmatic BA/BE are incorporated into the Eddy Gulch LSR Project.

Subsequent to completion of a draft BA/BE for the Eddy Gulch LSR Project, and NMFS and KNF review of the draft BA/BE, a conference call was held on December 22, 2008, to discuss

comments on the BA/BE. During this conference call between A. Berg (ID team fisheries biologist), D. Flickinger (NMFS), and J. Perrochet (KNF), it was determined that ESA consultation for the Eddy Gulch LSR Project could be concluded by using the tier form from the 2004 programmatic BA for the *Facility Maintenance and Watershed Restoration on the Klamath National Forest* for water drafting actions and that all the proposed actions, when considered collectively and individually, would either have no effect (as described in the "Efficiency Measures for Analysis" section of this BA/BE) or are not likely to adversely affect coho salmon and their critical habitat. Thus, ESA consultation for the actions with the ESA determination of "May Affect, Not Likely to Adversely Affect" has been completed using the tiering and compliance forms associated with the 2001 and 2004 programmatic consultation documents in the BA appendices. For this BA/BE, it was determined that the project would have indirect beneficial effects resulting from increased protection from wildfire.

In addition to the ID team and Level I meetings described above and field reviews of the Action Area, the following email and phone correspondences occurred with NMFS during the course of this consultation:

- Phone correspondence with Donald Flickinger, NMFS:
  - June 24, 2008, phone call to Don Flickinger discussed location of coho salmon critical habitat in Action Area relative to proposed actions; mechanical units, prescribed fire, previous KNF consultations with NMFS for similar actions, temporary roads, and future field sites to visit.
- Email correspondence with Don Flickinger, NMFS:
  - June 4, 2008, email regarding summary of June 3, 2008, field trip with KNF and Salmon River Restoration Council.
  - June 24, 2008, transmittal of KNF's programmatic Pre-Commercial Thin and Fuels Hazard Reduction Biological Assessment.
  - June 24, 2008, transmittal of Klamath National Forest Hazard Tree Policy—Safety Provisions on National Forest System Roads (USDA Forest Service 2005a).
  - June 25, 2008, email to ID team hydrologist regarding field reviews in future.
  - July 7, 2008, email to hydrologist regarding NMFS's comments to hydrologist's field notes from July 1, 2008, field trip.
  - August 8, 2008, email regarding meeting location for August 14, 2008, field trip.

Drafts of this BA/BE were reviewed by the NMFS Level 1 representative on December 11, 2008, and BA/BE was approved by Ray Haupt (District Ranger) Level 1 on April 20, 2009, via email from J. Perrochet.

The BA/BE was updated subsequent to NMFS' December 11, 2008, review to correct treatment acres (less acres than was described in the BA/BE), and Alternative C was modified to include hand line construction around some burn areas and to reduce the amount of underburning acreage in two Rx Units (Rx Unit 5 reduced by 418 acres and Rx Unit 6 by 404 acres; refer to mapped treatment

areas for Alternative C in Appendix A of the EIS). These changes represent a decrease in acreage to be treated and therefore potentially reduced the effects on listed species and their habitat relative to what was analyzed previously in the BA/BE and reviewed by NMFS. However, after consideration of these changes, it was determined that none of the changes to the BA/BE materially changed potential effects on listed species or their habitat, critical habitat, Essential Fish Habitat, or the ESA effects determination. Therefore, additional reviews by NMFS were not required.

III. Proposed Action

Type of Project: Fuels Reduction

The purpose of the Eddy Gulch LSR Project is to (1) protect existing and future late-successional habitat from threats (of habitat loss) that occur inside and outside LSRs, and (2) reduce wildfire threat to communities and municipal water supplies and increase public and firefighter safety. These objectives helped guide the development of proposed treatments and activities to increase resistance and resiliency to a wildfire and maintain or establish a trend towards desired resource conditions.

Project Summary

The Eddy Gulch LSR Project proposes 25,969 acres of treatments to increase resistance and resilience to wildfires and improve emergency access in the Eddy Gulch LSR Assessment Area. Three primary treatment types were identified in the Eddy Gulch LSR: Fuel Reduction Zones (FRZs), Prescribed Burn Units (Rx Units), and Roadside (RS) treatments along emergency access routes, which are described below.

- **FRZs**—strategically located on ridgetops to increase resistance to the spread of wildfires. They are wide enough to capture most short-range spot fires; surface, ladder, and crown fuels are reduced to change crown fires to surface fires within the treated areas.

  16 FRZs would be constructed totaling 8,291 acres. The 8,291 acres include 931 acres in 42 M Units (thinning units) and 7,383 acres in fuel reduction areas (outside the M Units) to reduce surface and ladder fuels.

- **Rx Units**—a series of landscape-level (250–4,300 acres) treatments designed to increase resilience to wildfires by reducing surface and ladder fuels. Most of these treatments would occur on south-facing aspects where fuels dry faster, and treatments would support the role of the FRZs. Approximately 17,524 acres of Rx Units to increase resiliency to wildfires.

- **Roadside (RS) treatments**—along emergency access routes identified in the Salmon River Community Wildfire Protection Plan (CWPP) and designed to facilitate both safe evacuation for residents and emergency access for suppression forces to safely enter the LSR in the event of a wildfire. Of the 60 miles of emergency access routes, 44 of the 60 miles would receive the same treatment as the FRZ or Rx Unit the route passes through, and these acres are already included in the 8,291 FRZ acres described above. There are treatments proposed along 16 miles (154 acres) of emergency access routes that do not pass through FRZs or Rx Units—the following RS treatments would occur along those 16 miles:

- RS1 treatments would consist of hand thin and pile burn on slopes greater than 45 percent.
- RS2 treatments would involve mastication on slopes less than 45 percent.
- RS3 treatments are in Riparian Reserves and would only consist of mastication, hand thin, and pile burn.

Generally, the RS treatments would occur along the following roads:

- National Forest System (NFS) Road 39 from County Road 1CO2 up to the northeast corner where it intersects the boundary of FRZ 15;
- NFS Road 40N61 (White's Gulch) from the intersection with Road 39 to the county road; and
- South side of NFS Road 40N54 from the intersection of the county road east to the intersection of 40N35.

Where treatments overlap designated land uses (such as northern spotted owl core areas or Riparian Reserves), treatments would be modified to comply with the Standards and Guidelines in the LRMP in those land use designations and the *Biological Assessment and Evaluation for Pre-commercial Thin and Release Actions and Fuel Hazard Reduction Actions* (USDA Forest Service 2001b).

Location

The Assessment Area is located in the 7th-field watersheds, listed above, on the Salmon River and Scott River Ranger Districts. The legal description of the Eddy Gulch LSR includes the following (all Mount Diablo Meridian):

- T38N, R11W, Sections 2-5, 8-10, and 17-19
- T38N, R12W, Sections 1-3, 9-16, and 22-24
- T39N, R10W, Sections 2-10, 15-21, and 29-31
- T39N, R11W, Sections 1-18, 20-29, and 32-36
- T39N, R12W, Sections 11-14, 23-25, and 36
- T40N, R10W, Sections 3-5, 8-11, and 13-35
- T40N, R11W, Sections 24-27 and 34-36
- T41N, R10W, Sections 2-5, 8-17, 20-24, 26-29, and 31-34
- T42N, R10W, Sections 28-29 and 32-35.

The Eddy Gulch LSR includes 60,331 acres of KNF lands and 2,323 acres of private lands. No actions are proposed on private lands.

See Figures C-1a and C-1b in Appendix C for locations of proposed actions.

Primary Project Elements of the Proposed Action (Alternative B – Preferred Alternative) and Alternative C–No New Temporary Roads Constructed

The term "Project Elements" refers to the various types of proposed treatments in the Eddy Gulch LSR Project Assessment Area. Both action alternatives propose thinning, fuels reduction treatments, and underburning, and both alternatives are similar in scope, scale, and location. The difference between the action alternatives is that Alternative C does not propose construction of the 1.03 miles of new temporary roads that are included in Alternative B. Thus, fewer acres of mechanical units would be thinned under Alternative C (less acreage would be underburned as well; refer to mapped treatment areas for Alternative C in Appendix A of the EIS). Alternative B would mechanically thin approximately 931 acres and Alternative C would mechanically thin approximately 832 acres. The magnitude of difference between the two action alternatives relative to potential impacts on fish and their habitat are insignificant because mechanical units and proposed temporary roads are not inside Riparian Reserves and are located on or near ridgetops. The proposed new temporary roads would not cross streams, and these roads would be closed, ripped, and re-contoured after use. Because potential effects of both action alternatives would not be materially different, both action alternatives are analyzed as "the project" in the effects section.

Design features applicable to both action alternatives include resource protection measures, Best Management Practices (BMPs), Wet Weather Operation Standards, forestwide soil cover standards, and KNF LRMP Standards and Guidelines. Application of these measures will minimize the impacts of each action alternative on aquatic resources considered herein.

Primary Project Elements

- **Fuels Reduction**: underburning, fireline construction, hand piling, pile burning, mastication, and mechanical thinning.
- **Road-related Activities**: construction of new temporary roads and subsequent road closure, re-opening of former logging access routes and subsequent closure, haul road maintenance, landing use, and hazard tree removal.
- **Water Drafting**

Project Element: Fuels Reduction

Prescriptions for mechanical thinning under both action alternatives (B and C) will consist of variable density thinning from below, which would take place with modifications for the stands topographic aspect, slope position, species composition, and relationship to other key habitat features (refer to the DEIR Table G-1, "General Thinning Prescriptions for Trees Greater Than 9 Inches DBH"). Trees in the smaller size classes (3 to 20 inches in diameter) would be removed; the removal of white fir would be emphasized. Variable Density Thinning (trees greater than 9 inches diameter at breast height [dbh] refer to the DEIR Table G-1 for thinning descriptions) would be as follows:

- Alternative B (Proposed Action)—931 acres
- Alternative C—832 acres

The following yarding systems would be used:

- Tractor
- Tractor Endlining
- Cable

Fuels on slopes under 45 percent would be treated by mastication. Mastication involves the mechanical chipping, grinding, and scattering of fuels using a rotating hydraulic head attached to a tracked excavator or tractor. Wood chips from mastication provide physical soil cover to disturbed areas and allows a masticator to operate on the layer of wood chips with minimal soil disturbance. The resulting compacted bed of fuel is usually no more than six inches in depth, allowing much less air circulation to the fuel and quicker decomposition. The result is a lower risk of fire starts and propagation of fire in areas treated with the masticator. Mastication would occur in Riparian Reserves.

Fuels on slopes over 45 percent would be treated by handpiling and pile burning. Handpiling of fuels is accomplished by hand crews using manual tools and chain saws. Hand piles are small in size, routinely no more than 6 feet in diameter. Burning of hand piles generally results in small areas of exposed soil surrounded by larger areas of unburned material. Handpiling and pile burning may occur within 15–30 feet of intermittent or small perennial streams in areas where treatment units are not located on granitic soils, or where the sideslopes entering intermittent and small perennial channels do not exceed 35 percent, or where soil cover estimates within 15 feet of the intermittent or small perennial streams are greater than 50 percent. For perennial streams greater than 1 foot in wetted width, handpiling with no burning may occur within 15–30 feet of the streambank. The guidelines for this to occur are as follows: the Contracting Officer's Representative or inspector will demonstrate, through a series of appropriately placed plots, that estimated soil cover exceeds 50 percent within the adjacent 15-foot no-handpile buffer (15 feet adjacent to streambank); handpiles will be spread out and not "stacked" above one another where, during burning, they could connect and affect a greater area than anticipated; or a linear area is developed that will increase the potential for erosion to occur; handpiles will be small in size, 6 feet or less in diameter.

Firelines would be constructed by handcrews. No fireline construction will occur in Riparian Reserves.

Underburns will be conducted at low intensity, and soil cover requirements will be met onsite to minimize erosion. No ignition will occur in Riparian Reserves, although fire would be allowed to back down or creep into Riparian Reserves from underburns lit upslope or nearby.

Some stands will have a combination of these methods since there is slope variation within stands.

Project Element: Road-Related Activities

Haul Routes—There are five basic routes to haul products out of the Assessment Area:

- 2E001 (Sawyers Bar). The route connects to County Road 1C01 with haul to Etna and Highway 3 to Yreka.

- 40N61 (Whites Gulch Road). The route connects to County Road 1C01 with haul to Etna and Highway 3 to Yreka.

- FS39. The route connects with County Road 1C02 with haul to Callahan and Highway 3 to Yreka.

- 39N20. The route connects with County Road 1C02 at Shadow Creek with haul to Callahan and Highway 3 to Yreka.

- 39N23. The route connects with County Road 1C02 at Cecilville with haul to Callahan and Highway 3 to Yreka.

All of these routes have been used in the past and are suitable for use with this project. Map 2 in the Transportation / Engineering Report for the draft environmental impact statement shows the location of the proposed haul routes in the Assessment Area. Prior to and during haul, a portion of the road maintenance needs will be dust abatement. Project road maintenance will be consistent with road maintenance activities addressed by the NMFS (2004b) letter of concurrence for *Facility Maintenance and Watershed Restoration,* and associated with the programmatic BA for *Facility Maintenance and Watershed Restoration on the Klamath National Forest* (USDA Forest Service 2004), and the Level II elevation that resulted in modification of the tier forms (USDA Forest Service-NMFS 2005b).

Hazard Tree Removal—Hazard trees (trees posing a hazard to yarding or hauling operations) will be removed along haul routes to meet requirements of the Occupational Safety and Health Administration, and implementation will follow the Klamath National Forest Hazard Tree Policy—Safety Provisions on National Forest System Roads (USDA Forest Service 2005a).

New Temporary Road Construction—New temporary roads (see Table 2 below and Figures C-1a and C-1b in Appendix C) would be constructed to access treatment units and landings—no new *authorized* roads would be constructed. Alternative B proposes the construction of approximately 1.03 miles (5,433 feet) of new temporary roads, which are needed to access all or portions of seven M Units. The new temporary roads would not cross Riparian Reserves / streams. Alternative B also proposes to re-open approximately 0.98 mile (5,177 feet) of former logging access routes to access all or portions of five M Units. Five spurs, each less than 100 feet long, would be bladed for tractor or cable yarding operations in two M Units.

Alternative C does not propose construction of 1.03 miles of new temporary roads that are included in Alternative B, but it still would use 0.98 mile of former logging access routes and the five short operational spurs.

Road Closure—All 1.03 miles of new temporary roads constructed under Alternative B would be closed (ripped and mulched, as needed) following thinning, and the approximately 0.98 mile of former logging access routes would be water-barred, vegetated, and closed immediately after thinning is completed. The new temporary roads proposed for use and closure do not have stream crossings.

TABLE 2. Proposed new temporary roads, former logging access routes, and operational spurs.

Location	Length (feet)	Access For	Description
Intersection 39N53	1,577	M Unit 15 (Cable)	New Temporary Road
Intersection 39N20	550	M Unit 17	New Temporary Road
Intersection 39N73	1,074	M Unit 21 (Cable)	New Temporary Road
Intersection FS39	605	M Unit 24	New Temporary Road
Intersection 39N58B	617	M Unit 36	New Temporary Road
Intersection 39N53A	560	M Unit 37	New Temporary Road
Intersection 39N37A	450	M Unit 75	New Temporary Road
Intersection 39N23	1,123	M Unit 9	Former Logging Access Route
Intersection 39N53	1,381	M Unit 15 (Tractor)	Former Logging Access Route
Intersection 39N58	519	M Unit 25	Former Logging Access Route
Intersection 39N04 – Lafayette Pt.	2,154	M Units 43 and 8	Former Logging Access Route
Intersection FS39A	240	M Unit 23	Four Logging Spurs at 60 Feet Each–Operations
Intersection 39N04A	100	M Unit 39	Short Logging Spur–Operations

Road closures will be done in a manner consistent with the *Facility Maintenance and Watershed Restoration* Letter of Concurrence (USDC NMFS 2004b) and associated programmatic BA for *Facility Maintenance and Watershed Restoration on the Klamath National Forest* (USDA Forest Service 2004b).

Water Drafting—All Project water drafting will follow NOAA-Fisheries Water Drafting Specifications (USDC NMFS 2001). Ten water drafting sites will be located in anadromous fish bearing reaches as follows (see Figure C-2 in Appendix C): Crawford Creek (1), Mathews Creek (1), North Fork Salmon River (1), North Russian Creek (3), Shadow Creek (1), South Russian Creek (1), South Fork Salmon River (1) and Whites Gulch (1).

Landings—Under both action alternatives, all landings proposed for use are existing, and none are within Riparian Reserves. The proposed landings are existing wide spots along roads and forest openings. The number of these areas is not available.

Table 3 shows how the proposed project activities would be distributed across the 7th- and 5th-field watersheds in the Assessment Area.

TABLE 3. Summary of project activities by 7th- and 5th-field watershed scales.

7th- and 5th-Field Watersheds	Watershed Area	FRZs	RS Treatments	Fuel Reduction Underburn	Fuels Reduction - Mechanical Thinning	Total Acres Treated by Fuels Reduction Actions	Total Acres Disturbed by Temporary Road Construction	Total % Area Disturbed by Proposed Action
	Acres							
7th-Field Watersheds								
Black Bear Creek	9,203.05	1,601.48	0	3,519.33	96.08	5,216.89	0.14	~ 56%
Cody-Jennings Creek	3,797.85	217.19	0	1,359.64	0	1,576.83	0	~ 41%
Crawford Creek	8,354.46	2,040.96	0	4,345.03	214.76	6,600.75	.03	~ 79%

TABLE 3. Summary of project activities by 7th- and 5th-field watershed scales (continued).

7th- and 5th-Field Watersheds	Watershed Area	FRZs	RS Treatments	Fuel Reduction Underburn	Fuels Reduction - Mechanical Thinning	Total Acres Treated by Fuels Reduction Actions	Total Acres Disturbed by Temporary Road Construction	Total % Area Disturbed by Proposed Action
	Acres							
7th-Field Watersheds (continued)								
Eddy Gulch	4,426.80	423.78	0	520.38	78.38	1,022.53	0	~ 23%
Gooey-Ketchum Creek	4,384.86	84.46	0	1.29	0	85.76	0	~ <1%
Gould-EF SF Salmon River	3,857.81	90.98	4.02	871.35	7.67	974.02	.01	~ 25%
Indian Creek	3,222.87	81.08	0	0	0	81.08	0	~ <1%
Kanaka-Olsen Creek	5,380.64	18.32	0	0	0	18.32	0	~ <1%
Lower North Russian Creek	4,495.60	0	.62	1,004.94	0	1005.57	0	~ 22%
Lower South Russian Creek	2,137.04	0	6.2	454.74	0	460.94	0	~ 21%
Matthews Creek	4,624.0	305.84	0	1,473.40	19.35	1,798.59	0	~ 39%
Robinson-Rattlesnake Creek	5,199.02	0	1.42	0	0	1.42	0	~ <1%
Shadow Creek	5,690.24	1,549.58	.03	3,072.01	442.34	5,063.96	1.56	~ 89%
Sixmile Creek	4,043.91	131.92	34.80	249.57	24.52	440.81	0	~ 10%
Tanner-Jessups Creek	4,546.11	87.99	0	.16	0.53	88.68	0	~ <1%
Taylor Creek	4,020.14	49.06	0	633.51	.02	682.59	0	~ 17%
Timber-French Creek	4,478.62	203.88	0	0	0	203.88	0	~ 4%
Upper North Russian Creek	3,127.48	951.15	0	16.82	19.6	1,010.57	0	~ 32%
Whites Gulch	8,579.50	439.80	106.15	0	28.8	574.22	0	~ 6%
Shiltos-Kelley Creek	3,900.94	14.34	0	0	0	14.34		
Totals 7th	**9,7470.94**	**8,291.81**	**153.24**	**17,522.17**	**931.53**	**26921.75**	**1.74**	
5th-Field Watersheds								
North Fork Salmon River	111,486.27	2,007.53	114.38	2,630.55	126.8	4,879.26	0	~ 4%
South Fork Salmon River	81,991.25	6,307.35	38.84	14,891.61	804.72	22,042.52	1.74	~27%
Totals 5th	**193,477.52**	**8291.88**	**153.22**	**17,522.16**	**931.52**	**26,921.78**	**1.74**	**~ 14%**

Project Timing

Project activities are scheduled to occur between April 15 and October 15. This period may be extended on either end of the stated seasonal range based on occurrence of all of the following criteria: (1) a long-term dry weather forecast, (2) the ability to winterize activities at the end of the day, (3) acceptance of recommendations from the district fisheries biologist and/or hydrologist (after meeting the first two criteria), and (4) authorization by the District Ranger (after meeting the first three criteria). Wet Weather Operation Standards (USDA Forest Service 2002a) will be followed whenever activities occur outside of the normal operating season (USDA Forest Service 2002). All landings and skid trail construction, road closure, and road re-conditioning will be conducted during the appropriate periods of weather and soil moisture to ensure BMP attainment and the avoidance of adverse effects on listed species (USDA Region 5 Soil Quality Handbook 1995b and BMP 5.6 in Appendix D). Favorable forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur.

Resource Protection Measures

The following resource protection measures have been included in the Proposed Action to avoid or minimize impacts on SONCC coho salmon and their critical habitat in the short and long term:

Treatment Stand Location—The project was designed by an ID team to minimize surface erosion at this scale by

- locating stands near existing roads to minimize the need for road and landing construction;
- limiting new temporary road construction and locating them outside of Riparian Reserves;
- adhering to the May 2002 Wet Weather Operations Standards (USDA Forest Service 2002a); and
- adhering to KNF LRMP Soil Cover Standards (USDA Forest Service 1995a).

Tractor, Mechanical Harvester, and Cable Yarding

- Dedicate no more than 15 percent of a stand to primary tractor skid trails, cable yarding corridors, and landings.
- Skidding equipment will be generally restricted to slopes less than 35 percent and operate during dry soil conditions (dry down to 10 inches) or follow the May 2002 Wet Weather Operation Standards (USDA Forest Service 2002a). There may be short sections of skid trails where slopes exceed 35 percent. Any sections of skid trails having slopes exceeding 35 percent will have slash or certified straw placed on them to achieve at least 90 percent soil cover.

- Skid trail locations will be designated by the KNF Sale Administrator / Contracting Officer's Representative / inspector prior to implementation. Skidding equipment will be confined to designated skid trails.

- Track-mounted masticators are limited to operation on slopes less than 45 percent.

- Minimize soil erosion by water-barring all skid trails, mulching with straw or fine slash (achieve 90 percent or more cover) the last 25 feet of all skid trails where they enter landings or roads where needed.

- Logs will be suspended when being yarded across channels. Skid trail crossings of localized, hydrologically disconnected ephemeral channels (no Riparian Reserve present) will be uncommon and in such cases require remedial shaping.

- Prevent road runoff from draining onto skid trails, cable yarding corridors, or landings by use of waterbars, mulching with straw or fine slash, etc.

- Retain existing coarse woody debris whenever possible, provided the amount of logs retained meets fuel management objectives.

- Meet the KNF LRMP Soil Cover Standards for each harvest unit as measured before the fall rainy season (late October). Post-treatment total soil cover should range from 60–70 percent, depending on slopes steepness and fuel reduction treatments.

- At least 50 percent cover, as fine organic matter (less than 3-inch material), will be retained in all units.

Underburning, Hand Piling, and Pile Burning

The following measures are for protection of intermittent and perennial streams, springs, and active landslides and inner gorges:

- Prescribed fire will not be ignited in Riparian Reserves but will be allowed to back down into the reserves. Underburning will be kept at the level of a low-intensity backing fire adjacent to Riparian Reserves.

- If percent soil cover is below soil cover guidelines or predicted to be below after burning, ignition will cease at this point (see BMPs 6.2 and 6.3).

- Handpiling and pile burning may occur within 15–30 feet of intermittent or small perennial streams in areas where treatment units are not located on granitic soils, or where the sideslopes entering intermittent and small perennial channels do not exceed 35 percent, or where soil cover estimates within 15 feet of the intermittent or small perennial streams are greater than 50 percent. For perennial streams greater than 1 foot in wetted width, handpiling with no burning may occur within 15–30 feet of the streambank. The guidelines for this to occur are as follows: the Contracting Officer's Representative or inspector will demonstrate, through a series of appropriately placed plots, that estimated soil cover exceeds 50 percent within the adjacent 15-foot no-handpile buffer (15 feet adjacent to streambank); handpiles will be spread out and not

"stacked" above one another where, during burning, they connect and affect a greater area than anticipated; or a linear area is developed that will increase the potential for erosion to occur; handpiles will be small in size, 6 feet or less in diameter.

- Hand piles will be spread out and not "stacked" above one another to keep them from connecting and affecting a greater area than anticipated during burning. Hand piles will not be closely aligned in any orientation that could increase the potential for erosion to occur.

- Hand piles will be small in size, 6 feet or less in diameter.

Roads and Landings

- Existing roads and landings will be used to minimize new construction.

- Roads will be cleared and graded, as necessary, to allow log truck and equipment access using minimum disturbance methods and minimum clearing widths.

- New temporary roads constructed for this project will be graded to outslope where necessary to minimize erosion and runoff.

- Erosion control measures described in BMP 1.13 will be applied to the new temporary roads and former logging access routes that will be used during the project.

- The new temporary roads will be outsloped where necessary to reduce erosion, covered with slash, if needed, and blocked after the harvest season (prior to the first winter after use). The temporary roads will be closed at project completion.

- Refueling and maintenance of project motorized equipment will occur at least 200 feet away from any channel.

Hazard Tree Removal

Hazard tree removal will be consistent with the "Klamath National Forest Hazard Tree Policy—Safety Provisions on National Forest System Roads" (USDA Forest Service 2005a). NMFS concluded informal consultation for hazard tree removal in a July 17, 1997 (USDC NMFS 1997b) for the "Road and Trail Maintenance, Watershed Restoration" and January 1997 "Flood Response Actions on the Klamath National Forest" (USDC NMFS 1997a) and subsequently provided a letter of concurrence for the Klamath National Forest "Forest Wide Watershed Restoration Biological Assessment," which included hazard tree removal (USDC NMFS 2004b).

- A tree is considered a hazard if all or a portion of the tree has a high potential to fall or roll onto a roadway or facility and cause personal injury or property damage. Distance to trees on the uphill side of a roadway or facility may exceed one tree height if they are likely to roll or slide onto the roadway, site, or facility (that is, there are insufficient barriers to prevent trees from reaching the roadway, trail, or facility). The hazard tree identification process will be used for trees along road systems.

- Hazard trees that require felling within Riparian Reserves are routinely left on site. These trees may be needed to maintain and/or restore large woody debris function and abundance within Riparian Reserves.

- Naturally fallen or felled hazard trees may be removed from Riparian Reserves if

  - trees must be removed to provide safe road passage or campground access, OR

  - The trees would pose a substantial risk to the forest road drainage system integrity, AND

  - A fisheries biologist determines, through site inspection and written documentation, that removal of individual hazard trees within interim Riparian Reserves is not inconsistent with the Aquatic Conservation Strategy Objectives. Removal would only be appropriate when a local area survey of the affected Riparian Reserves clearly indicates that the functioning level with respect to large wood will not change from current levels after individual tree removal.

Water Drafting

All project water drafting will follow NOAA-Fisheries Water Drafting Specifications (USDC NMFS 2001), including but not limited to the following:

- Drafting will not reduce the stream flow by more than 10 percent.

- When water is drafted, intakes will be screened with 3/32-inch mesh (for rounded or square openings) or 1/16-inch mesh for slotted opening.

- Pumping rate shall not exceed 350 gallons per minute or 10 percent of the stream flow.

- Pumping will be terminated when the water tank is full.

- Water drafting sites for dust abatement on roads will occur at designated sites for that purpose. Erosion-control measures will be employed on the access and/or main road to prevent water leakage from causing stream sedimentation. Hazardous material spill prevention and containment equipment will be present on water trucks. Water trucks and pumping equipment will be in a well-maintained condition, free of fluid leaks, and have hoses in good operating condition.

Equipment Refueling and Maintenance

- Refueling and maintenance of project motorized equipment will occur at least 200 feet away from any channel (BMP given in USDA Forest Service 2003).

- BMP 2.12 (Appendix D) will guide all fueling and lubricating actions and, in particular, fuel containment systems will be in place on landings as necessary.

Riparian Reserves

The mapped Riparian Reserves are shown on Figures C-1a and C-1b in Appendix C. One site-potential tree height for the Assessment Area is 170 feet on each side of a qualifying stream channel.

The Record of Decision on the Northwest Forest Plan defined standard slope distance for Riparian Reserves as two site-potential tree heights or 300 feet for anadromous and resident fish-bearing streams (whichever is greater) and one site-potential tree height or 150 feet for nonfish-bearing streams (whichever is greater). This project will use the Riparian Reserve width of 340 feet for fish-bearing streams and 170 feet on each side of an active stream channel for nonfish-bearing streams. See Appendix E for a summary of project activities occurring near or within Riparian Reserves.

Mechanical harvest will not occur in Riparian Reserves, but fuels reduction activities would occur in Riparian Reserves, as described in the Indicator discussion. The potential for hazard tree felling in Riparian Reserves is described above in the section titled "Road-Related Activities Project Elements" and also under "Hazard Tree Removal."

Best Management Practices

The BMPs were developed with the State of California Water Quality Control Board to protect water quality (USDA Forest Service 2000a). Compliance with all BMPs related to timber management practices will greatly minimize or avoid adverse effects on listed fish. Project BMPs were chosen by the ID team to support the design of the Proposed Action (Alternative B) and also the effects analysis contained in the environmental impact statement, this BA/BE, and other environmental documents related to this project. The BMPs will be in effect during implementation of all project activities (see Appendix D for a list of applicable BMPs).

Wet Weather Operation Standards

Wet Weather Operation Standards (USDA Forest Service 2002) will be used to guide operations, especially hauling, during periods of wet weather. Earth scientists will examine field conditions to determine when the soil and roads have dried out enough to enable operations to resume without risk of watershed impacts. The earth scientists will make recommendations to the Timber Sale Administrator who will provide direction to the Timber Sale Contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided. The KNF LRMP Soil Cover Guidelines pages 4–21 (USDA Forest Service 1995b) will be met to minimize soil compaction and erosion during and after timber harvest within each treatment unit and underburn area.

IV. Description of Action Area, Affected Species, Critical Habitat, Essential Fish Habitat

Action Area—The Action Area is defined for ESA purposes as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved action" (50 CFR 402). The Action Area for this BA/BE includes 7th-field watersheds where Project Elements would occur, plus anadromous fish habitat downstream of where Project Elements would occur, to the point where streams meet the mainstem of the Salmon River.

Affected Species and Presence of Critical Habitat—The following Pacific salmonid Evolutionary Significant Units and their habitat in the Salmon River basin have special status under the ESA or are given special management consideration as Forest Service Sensitive species:

Endangered:	None
Threatened:	SONCC coho salmon
Critical Habitat:	SONCC coho salmon
Proposed:	None
Sensitive:	Upper Klamath-Trinity Chinook salmon; Klamath Mountains Province steelhead
Essential Fish Habitat:	SONCC coho salmon; Upper Klamath-Trinity Chinook salmon
Management Indicator Species:	Steelhead; resident rainbow trout

The Salmon River basin provides approximately 175 miles of anadromous fish habitat (USDA Forest Service 2002b) distributed within the main stem, Wooley Creek, and North Fork and South Fork of the Salmon River.

Biological requirements and life history information for the above Pacific salmonids potentially affected by the Proposed Action are described in Appendix F of this BA/BE. Conclusions regarding anadromous fish and their habitat (including critical habitat) occurrence are based on field review of habitat suitability, professional judgment of the fisheries biologists, District fish field survey records, and California Department of Fish and Game information—data from all these sources were compiled into the KNF steelhead trout distribution layer in the KNF Geographic Information System (GIS) electronic library. The distribution of anadromous fish within the Action Area is shown as a conservative approximation using steelhead trout distribution as shown on Map C-3 in Appendix C. The steelhead trout distribution over-estimates the extent of coho salmon, critical habitat, Chinook salmon, and Pacific salmon Essential Fish Habitat, except where site-specific field surveys refine Chinook salmon, coho salmon, and critical habitat distribution (such as, if the habitat is found to be inaccessible for coho salmon, Chinook salmon, or both). The KNF considers the use of the KNF Steelhead Trout Distribution layer to define Chinook salmon habitat and coho salmon critical habitat, as a conservative (inclusive) approach for assessment of effects on coho and Chinook habitat (including critical habitat). The reason is that coho and Chinook salmon may not occupy the same waters as steelhead due to the differences in jumping abilities. The maximum jumping height for coho is approximately 2.2 meters (7 feet), Chinook salmon is 2.4 meters (8 feet), and steelhead is 3.4 meters (11 feet) (Meehan 1991).

V. Existing Environment and Effects on Anadromous Fish and Their Habitat Indicators

This section describes existing conditions and an analysis of the direct and indirect effects of the project on listed anadromous fish and their habitat (including critical habitat) at the site, the 7th- and/or 5th-field watershed scales. Habitat requirements (expressed by the key habitat Indicators) are similar for all salmonids considered in this BA/BE. Existing conditions and effects are rated using criteria in Appendix B, which summarizes the existing environment and effects for all Indicators, with data sources identified.

The analysis of the potential effects on anadromous fish and their habitat is based on Alternative B, which is the Proposed Action and Forest Service preferred alternative. This alternative was determined to have materially the same impacts as Alternative C relative to anadromous fish and their habitat.

The analysis of potential effects on anadromous fish and their habitat is organized by direct and indirect effects. Indirect effects are described as effects on key habitat Indicators for anadromous salmonids. The Indicators originate from Appendix A of the Analytical Process (*Table of Population and Habitat Indicators)*. The evaluation of habitat Indicators is given below, as well as summarized in tables for each subject watershed in Appendix B of this BA/BE. "Population characteristics" and "Population and population and habitat" listed in Appendix A of the Analytical Process are not evaluated because these were established for bull trout. The population status of BA/BE species are discussed in Appendix F. The pathways in the tables are addressed based on the best available information. The ID team's fisheries biologist and hydrologist and the KNF's hydrologist used scientific data, field reviews, and the Cumulative Watershed Effects (CWE) modeling to determine the existing conditions and to estimate potential risk (probability) and magnitude of sediment delivery from surface erosion (using the Universal Soil Loss Equation – USLE), mass-wasting (using the GEO model component), and flow-related watershed conditions (using the ERA [equivalent roaded area] model component) in the Action Area (Appendix G). The results of CWE modeling are discussed below under the Sediment/Turbidity/Substrate character, Change in Peak and Base Flow, and Disturbance Indicators.

The final ESA determination for the Eddy Gulch LSR Project was made after considering the intensity and extent of the proposed activities, the proximity of anadromous fish to proposed activities, and the distribution and life history of anadromous fish in the Action Area. The distribution of salmonid habitat relative to proposed treatment units is shown in Figures C-1a and C-1b in Appendix C. Fish-bearing streams extend into, or are adjacent to, underburn units in Black Bear Creek, Cody-Jennings (South Fork Salmon River), Crawford Creek, Eddy Gulch (0.25 mile from the creek), Gould-East Fork South Fork Salmon River, Lower South Russian Creek, Mathews Creek, Shadow Creek, and Sixmile Creek. Salmonid habitat is also near (as the crow flies) FRZs in most watersheds, although FRZs are located on ridgetops. All mechanical units are on ridgetops and, in most watersheds, are from 1 to 2 miles from anadromous fish habitat. However, in Shadow and Crawford creeks, M Unit 21 and M Unit 7S (thinning units) are 0.3 mile and 0.6 mile (respectively) from anadromous fish habitat.

The proximity of Project Elements (types of proposed treatments) relative to anadromous fish and their habitat are further described in Table 4 below.

The various Project Elements considered for analysis include fuels reduction (including mechanical thinning), road-related activities (including hazard tree removal, road use, road maintenance, new temporary road construction and closure, use of former logging access routes, and landing use), and water drafting.

For this BA/BE it is assumed that spawning, feeding, rearing, and migration can occur within all habitat occupied by any of the Evolutionary Significant Units addressed in this document, unless otherwise stated.

TABLE 4. Proximity: closest distance between project activities and anadromous fish and their habitat within 7th-and 5th-field watersheds.

7th-Field Watersheds	Stream Name Associated with 7th- or 5th-Field Watershed	Closest Distance to Habitat Occupied by Coho, Chinook Salmon	Distance to Habitat Occupied by Steelhead Trout	Distance to Critical Habitat and Chinook Habitat
		Miles		
Black Bear Creek	Black Bear Creek	• Mechanical units: on ridgetop ~1.3 mile in M Unit 12 • FRZ: on ridgetop ~0.25 mile • New Temporary Road: on ridgetop ~1.5 mile • Underburn: 0; adjacent • Water Drafting: 0	• Mechanical units: on ridgetop ~1.3 mile in M Unit 12 • FRZ: on ridgetop ~0.25 mile • New Temporary Road: on ridgetop ~1.5 mile • Underburn: 0; adjacent • Water Drafting: 0	• Mechanical units: on ridgetop ~1.3 mile in M Unit 12 • FRZ: on ridgetop ~0.25 mile • New Temporary Road: on ridgetop ~1.5 mile • Underburn: 0; adjacent • Water Drafting: 0
Cody-Jennings Creek	South Fork (SF) Salmon River	• Mechanical units: Note applicable (N/A) • FRZ: on ridgetop ~0.25 mile • New Temporary Road: N/A • Underburn: 0; adjacent to streams	• Mechanical units: N/A • FRZ: on ridgetop ~0.25 mile • New Temporary Road: N/A • Underburn: 0; adjacent to streams	• Mechanical units: N/A • FRZ: on ridgetop ~0.25 mile • New Temporary Road: N/A • Underburn: 0; adjacent to streams
Crawford Creek	Crawford Creek	• Mechanical units: on ridgetop ~0.6 mile in M Unit 7S • FRZ: on ridgetop ~0.4 mile • New Temporary Road: N/A • Underburn: 0; adjacent to streams • Water Drafting: 0	• Mechanical units: on ridgetop ~0.6 mile in M Unit 7S • FRZ: on ridgetop ~0.4 mile • New Temporary Road: N/A • Underburn: 0; adjacent to streams • Water Drafting: 0	• Mechanical units: on ridgetop ~0.6 mile in M Unit 7S • FRZ: on ridgetop ~0.4 mile • New Temporary Road: N/A • Underburn: 0; adjacent to streams • Water Drafting: 0
Eddy Gulch	Eddy Gulch	• Mechanical units: on ridgetop ~1 mile in M Unit 73 • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: 0.25 mile; adjacent to headwater tributaries	• Mechanical units: on ridgetop ~1 mile in M Unit 73 • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: 0.25 mile; adjacent to headwater tributaries	• Mechanical units: on ridgetop ~1 mile in M Unit 73 • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: 0.25 mile; adjacent to headwater tributaries
Gooey-Ketchum	East Fork / South Fork Salmon River	• Mechanical units: N/A • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: N/A
Gould-East Fork South Fork Salmon River	East Fork / South Fork Salmon River Headwaters	• Mechanical units: ~1.0 mile on ridgetop in M Unit 22 • FRZ: ~0.5 mile on ridgetop • New Temporary Road: N/A • Underburn: 0; adjacent to South Fork Salmon • Water Drafting: 0	• Mechanical units: ~1.0 mile on ridgetop in M Unit 22 • FRZ: ~0.5 mile on ridgetop • New Temporary Road: N/A • Underburn: 0; adjacent to South Fork Salmon • Water Drafting: 0	• Mechanical units: ~1.0 mile on ridgetop in M Unit 22 • FRZ: ~0.5 mile on ridgetop • New Temporary Road: N/A • Underburn: 0; adjacent to South Fork Salmon • Water Drafting: 0

TABLE 4. Proximity: closest distance between project activities and anadromous fish and their habitat within 7th-and 5th-field watersheds (continued).

7th-Field Watersheds	Stream Name Associated with 7th- or 5th-Field Watershed	Closest Distance to Habitat Occupied by Coho, Chinook Salmon	Distance to Habitat Occupied by Steelhead Trout	Distance to Critical Habitat and Chinook Habitat
		Miles		
Indian Creek	Indian Creek, South Fork Salmon River	• Mechanical units: N/A • FRZ: ridgetop approx. 2 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: ridgetop approx. 2 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: ridgetop approx. 2 miles • New Temporary Road: N/A • Underburn: N/A
Lower North Russian Creek	North Russian Creek	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: 0 • Water Drafting: 0	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: 0 • Water Drafting: 0	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: 0 • Water Drafting: 0
Lower South Russian Creek	South Russian Creek	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: 0	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: 0	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: 0
Matthews Creek	Mathews Creek	• Mechanical units: N/A • FRZ: on ridgetop ~1.5 miles • New Temporary Road: N/A • Underburn: 0; adjacent to streams • Water Drafting: 0	• Mechanical units: N/A • FRZ: on ridgetop ~1.5 miles • New Temporary Road: N/A • Underburn: 0; adjacent to streams • Water Drafting: 0	• Mechanical units: N/A • FRZ: on ridgetop ~1.5 miles • New Temporary Road: N/A • Underburn: 0; adjacent to streams • Water Drafting: 0
Shadow Creek	Shadow Creek	• Mechanical units: 0.3 in M Unit 21 • FRZ: on ridgetop ~0.3 mile • New Temporary Road: on ridgetop ~0.5 mile in M Unit 21 • Underburn: 0; adjacent to streams • Water Drafting: 0	• Mechanical units: 0.3 in M Unit 21 • FRZ: on ridgetop ~0.3 mile • New Temporary Road: on ridgetop ~0.5 mile in M Unit 21 • Underburn: 0; adjacent to streams • Water Drafting: 0	• Mechanical units: 0.3 in M Unit 21 • FRZ: on ridgetop ~0.3 mile • New Temporary Road: on ridgetop ~0.5 mile in M Unit 21 • Underburn: 0; adjacent to streams • Water Drafting: 0
Sixmile Creek	Sixmile Creek	• Mechanical units: ~on ridgetop ~1.5 miles M Unit 24 • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: 0; adjacent in lower watershed	• Mechanical units: ~on ridgetop ~1.5 miles M Unit 24 • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: 0; adjacent in lower watershed	• Mechanical units: ~on ridgetop ~1.5 miles M Unit 24 • FRZ: on ridgetop ~1.0 mile • New Temporary Road: N/A • Underburn: 0; adjacent in lower watershed
Tanner-Jessups Creek	North Fork Salmon River	• Mechanical units: N/A- on ridgetop in adjacent watershed • FRZ: on ridgetop ~2.5 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A- on ridgetop in adjacent watershed • FRZ: on ridgetop ~2.5 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A- on ridgetop in adjacent watershed • FRZ: on ridgetop ~2.5 miles • New Temporary Road: N/A • Underburn: N/A

TABLE 4. Proximity: closest distance between project activities and anadromous fish and their habitat within 7th-and 5th-field watersheds (continued).

7th-Field Watersheds	Stream Name Associated with 7th- or 5th-Field Watershed	Closest Distance to Habitat Occupied by Coho, Chinook Salmon	Distance to Habitat Occupied by Steelhead Trout	Distance to Critical Habitat and Chinook Habitat
		Miles		
Taylor Creek	Taylor Creek	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0
Timber-French Creek	South Fork Salmon River	• Mechanical units: N/A • FRZ: 170 feet; adjacent to Riparian Reserve (RR) • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0	• Mechanical units: N/A • FRZ: 170 feet; adjacent to RR • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0	• Mechanical units: N/A • FRZ: 170 feet; adjacent to RR • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0
Upper North Russian Creek	North Russian Creek	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A
Whites Gulch	Whites Gulch	• Mechanical units: on ridgetop ~2 miles; M Unit 15 and M Unit 54 • FRZ: on ridgetop ~0.75 mile • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0	• Mechanical units: on ridgetop ~2 miles; M Unit 15 and M Unit 54 • FRZ: on ridgetop ~0.75 mile • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0	• Mechanical units: on ridgetop ~2 miles; M Unit 15 and M Unit 54 • FRZ: on ridgetop ~0.75 mile • New Temporary Road: N/A • Underburn: N/A • Water Drafting: 0
Kanaka-Olsen Creek	North Fork Salmon River	• Mechanical units: N/A • FRZ: on ridgetop ~1.75 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: on ridgetop ~1.75 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: on ridgetop ~1.75 miles • New Temporary Road: N/A • Underburn: N/A
Robinson-Rattlesnake Creek	North Fork Salmon River	• Mechanical units: N/A • FRZ: on ridgetop ~1.5 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: on ridgetop ~1.5 miles • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: on ridgetop ~1.5 miles • New Temporary Road: N/A • Underburn: N/A
Upper Etna Creek	Etna Creek	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A	• Mechanical units: N/A • FRZ: N/A • New Temporary Road: N/A • Underburn: N/A

The probability for short- and long-term indirect effects on anadromous fish is associated with direct effects and effects on instream habitat in the context of existing conditions. Thus, direct and indirect effects are discussed first and then existing conditions are discussed under each key habitat Indicator, followed by an effects discussion for each Indicator.

Efficiency Measures for Analysis

Geographic area refined to reflect the location of proposed actions, potential effects on hydrologic processes, and effects on anadromous salmonids. The Action Area includes areas within twenty 7th-field watersheds (Table 5 below) in which project activities are proposed, with the exceptions described below and shown in Table 5 as the four 7th-field watersheds in italics.

The proposed FRZs drape across ridges as a matter of their design. Three of the 7th-field watersheds (italicized bold in Table 5) contain very small acreages of proposed treatment, and the ridgetop treatments are remote from streams; those three watersheds are Kanaka-Olsen, Robinson-Rattlesnake, and Upper Etna. FRZ treatments in these three watersheds range in size from 0.02 acre to 18 acres, and the proposed treatments involve a low-impact combination of underburning and mastication on ridgetops. These three watersheds were included in the CWE analysis for the project but are not discussed further in this document because fisheries biologists and hydrologists determined that these activities would have no effect on water quality, aquatic species, or their habitat.

In addition to the exclusions proposed above, four 7th-field watersheds are divided hydrologically by the South Fork Salmon River (Figures C-1a and C-1b in Appendix C) and have no activities proposed in 50 percent of their watershed areas: Gooey-Ketchum, Gould East Fork-South Fork Salmon, Timber-French, and Cody-Jennings. These watershed areas with no activities have not been analyzed further in this document. These four split watersheds are indicated in italics in Table 5.

Taylor Creek (tributary to the South Fork Salmon River) does not have anadromous salmonids, only resident rainbow trout; therefore, Taylor Creek has not been analyzed relative to effects on fish or their habitat.

In summary, of the twenty 7th-field watersheds in the Action Area, only 16 have been analyzed further due to reasons described above, and of the 16 watersheds included, 4 are split hydrologically, with no project activities proposed in major portions of these watersheds.

TABLE 5. Action Area 7th-field watersheds,
proposed treatment acres, and miles of fish-bearing streams.

7th-Field Watershed	Proposed Treatment Acres	Miles of Fish-Bearing Streams
Black Bear Creek	5,217	4.3
Cody-Jennings Creek	1,577	5.3
Crawford Creek	6,600	4.2
Eddy Gulch	1,022	2.7
Gooey-Ketchum Creek	86	4.8
Gould-East Fork South Fork Salmon River	974	0.5
Indian Creek	82	1.0
Lower North Russian Creek	1,006	4.7
Lower South Russian Creek	461	2.2

TABLE 5. Action Area 7th-field watersheds, proposed treatment acres, and miles of fish-bearing streams (continued).

7th-Field Watershed	Proposed Treatment Acres	Miles of Fish-Bearing Streams
Matthews Creek	1,799	1.5
Shadow Creek	5,064	1.9
Sixmile Creek	441	2.5
Tanner-Jessups Creek	89	2.6
Taylor Creek	683	0
Timber-French Creek	204	7.1
Upper North Russian Creek	1,011	1.2
Whites Gulch	574	1.6
Kanaka-Olsen Creek	18	3.6
Robinson-Rattlesnake Creek	2	4.6
Upper Etna Creek	0.02	1.1

In addition to the 7th-field watersheds listed above, the following 5th-field watersheds are also within the Action Area because aquatic habitat in the LSR is hydrologically linked to downstream areas:

5th-field Watersheds

- North Fork Salmon River
- South Fork Salmon River
- South Fork Scott-French Creek

The South Fork Scott-French watershed contains less than 1 acre of treatment area within the Upper Etna 7th-field watershed. For the same reasons cited above (minimal treatment acreage proposed in ridgetop location, resulting in no effect on water quality, aquatic species, and their habitat) for the Upper Etna watershed, the South Fork Scott-French 5th-field watershed is not analyzed further in this document.

Project Elements That Will Have No Effect on Salmonids or Their Habitat in the Action Area.

Mechanical Units—The location and extent of proposed mechanical units are shown on Figures C-1a and C-1b in Appendix C. The distances between stands and SONCC coho salmon habitat were given in Table 4 above. Mechanical Units are located on ridgetops and do not contain live streams. Project activities would occur near but not within Riparian Reserves in the following M Units:

- M Unit 16 (intermittent stream Riparian Reserve on northeast boundary—unit boundary will be held outside the reserve)
- M Unit 19 (tip of intermittent stream Riparian Reserve in lower portion of unit—will exclude the reserve)
- M Unit 21 (intermittent or ephemeral Riparian Reserve on southwest boundary—unit boundary will be held outside the reserve)

- M Unit 24 (intermittent or ephemeral Riparian Reserve on south unit boundary—unit boundary will be held outside the reserve)
- M Unit 51 (unit adjacent to mapped active landslide, which is not showing evidence of movement, with Riparian Reserve for protection)
- M Unit 61 (spring-fed headwater draws flank unit on both sides, not mapped as Riparian Reserves but are clearly wet—unit boundaries will exclude wet areas plus 50-foot buffer)
- M Unit 64 (intermittent stream Riparian Reserve on south unit boundary)

Mechanical units would be treated to thin stands and reduce ladder fuels. Units are located along ridges and pose no risk relative to generating sediment or delivering sediment to salmonids or their habitat. Tractors, cable systems, and feller-bunchers may be used to remove trees that have been cut by chainsaws. Tractor piling of brush and slash would occur on ground with less than 35 percent slope.

Intermittent channels that occur in proposed mechanical units would be protected by 170-foot Riparian Reserves on each side of each channel. Ephemeral Riparian Reserves are variable, depending on the feature needing protection but would similarly protect these channels. Tractor-yarding equipment will stay out of Riparian Reserves in every unit, and units are not located in close proximity to anadromous salmonid habitat. Tractor yarding may cause small, localized soil displacement in yarding corridors associated with dragging logs. This could increase the potential for erosion within units. Yarding corridors would be placed in natural openings when possible to minimize felling of trees and to maintain ground stability provided by trees.

Existing skid trails would be used whenever available. Full-bench skid trail construction would be avoided whenever possible. End lining would be used wherever possible to keep equipment on main skid trails and to minimize compaction of soils. Cable yarding may also cause small, localized soil displacement in yarding corridors resulting from dragging logs. KNF LRMP Soil Cover Standards will be followed to minimize the amount of bare soil and to protect soil after it has been disturbed. Thus, skid trails on slopes over 35 percent will be mulched with on-site fine slash, chips, or weed-free straw, where necessary. Skid trails would be waterbarred after use to control runoff and to prevent off-site sedimentation (BMP 1.17).

If any sediment is generated from localized soil displacement, it is expected that its potential impacts would be precluded because implementation of BMPs would minimize erosion on site. If any sediment is generated from localized soil displacement, it would be expected to be a negligible amount due to project design, resource protection, and impact avoidance measures described above. This potential negligible amount of sediment would likely not be delivered to anadromous streams because units are located on ridgetops, and any units with Riparian Reserves would not deliver sediment downstream because intact vegetation and soil cover in Riparian Reserves are expected to function to retain sediment. Broderson (1973) documented that riparian buffers of approximately one site-potential tree height on each side of streams are effective in removing/retaining sediment under most conditions. USDA-FS, USDI-BLM (2005) included research that shows a 150-foot buffer (approximately one site-potential tree height) provides suitable shade and temperature buffering for streams. This Project Element would therefore not affect key habitat Indicators of instream sediment,

turbidity, stream substrate, water temperature, or other anadromous salmonid habitat Indicators and would therefore have no effect on anadromous salmonids or their habitat.

Road-Related Activities Project Elements

Temporary Road Construction—The temporary roads proposed under Alternative B would have no effect on salmonids or their habitat because (1) all road segments are on ridgetop locations and distant from salmonid habitat; (2) proposed new temporary roads do not cross Riparian Reserves or streams; (3) new temporary roads will be outsloped where necessary to reduce erosion, covered with slash, if needed, and blocked after each season of use and prior to winter storms, and then permanently closed by the end of the project; and (4) none of the proposed roads are located on slopes with indicators of active or latent instability. Alternative C would not construct the 1.03 miles of new temporary roads, but it still proposes to use 0.98 mile of former logging access routes. Road beds are existing, and this project component would also have no effect on salmonids or their habitat for the same reasons listed above.

Landings—The landings proposed for use are existing wide spots along roads or forest openings, and all are located outside of Riparian Reserves. The landings are distant and hydrologically disconnected from anadromous salmonid habitat and would therefore have no effect on anadromous fish or their habitat. Soil Quality Standards and BMPs for landings would be implemented to minimize erosion. Intact and functioning Riparian Reserves will protect intermittent and ephemeral stream channels from sediment delivery by intercepting sediment.

Project Elements That Fit Under Existing KNF ESA Programmatic Consultations for Anadromous Watersheds

An intent of the ESA streamlined consultation procedures (USDA Forest Service, USDI BLM and USFWS, USDCC NMFS 1999) is to efficiently conclude consultation on actions that comply with management plans and programmatic consultations. The following five Eddy Gulch LSR Project Elements comply with previous ESA programmatic consultations:

1. Hazard Tree Removal
2. Haul Route Use and Maintenance
3. Road Closure
4. Fuels Reduction Actions
5. Water Drafting

The specific programmatic ESA consultation documents under which the above five Project Elements are tiered to include the following:

- *Facility Maintenance and Watershed Restoration Biological Assessment* (USDA Forest Service 2004).
- *Biological Assessment for Pre-commercial Thin and Release Actions and Fuels Hazard Reduction Actions on the Klamath National Forest* (USDA Forest Service 2001b)

These Project Elements that tier to existing programmatic consultations will not be discussed further in the BA (with the exception of water drafting), as required by the programmatic pre-commercial thin and fuel hazard reduction consultations, a tiering form is attached in Appendix H.

Site Scale and 7th- and 5th-Field Watershed Scales
Anadromous Fish Habitat Exposure Analysis

The following 16 watersheds in the Action Area contain anadromous fish habitat that may be affected by project activities: Black Bear Creek, Cody-Jennings Creek, Crawford Creek, Eddy Gulch, Gooey-Ketchum Creek, Gould East Fork South Fork Salmon River, Indian Creek, Lower North Russian Creek, Lower South Russian Creek, Mathews Creek, Shadow Creek, Sixmile Creek, Tanner-Jessups Creek, Timber-French Creek, Upper North Russian Creek, and Whites Gulch.

The potential effects on anadromous fish and their habitat in these sixteen 7th-field watersheds were evaluated at the site scale and 7th-field watershed scale and aggregated with other Project Elements in other watersheds in the Action Area (see the Proposed Action section of this BA/BE) to determine effects at the 5th-field watershed scale and over the entire Action Area. Based on field reviews and consideration of proximity to anadromous fish and their habitat (refer to Table 4 above), along with the probability of direct, indirect, and cumulative effects, the area where there is potential for exposure of anadromous fish and their habitat within the Action Area is as follows:

Site Scale—The only potential direct effect on anadromous fish and their habitat at the site scale is associated with water drafting because this is the only activity that would occur in live stream channels within anadromous fish-bearing reaches (see Figure C-2 in Appendix C) as follows: Crawford Creek (1), Mathews Creek (1), North Fork Salmon River (1), North Russian Creek (3), Shadow Creek (1), South Russian Creek (1), South Fork Salmon River (1), and Whites Gulch (1).

Mechanical treatments, fuels reduction activities, and road-related activities would have no direct or indirect effects on anadromous salmonids or their habitat at the site scale. Potential indirect effects, as well as effects minimization measures required for all other Project Elements, were described in the programmatic consultation documents listed above.

7th- and 5th-Field Watershed Scales—Mechanical treatments would have no direct or indirect effects at the 7th-field watershed scale (refer to Table 4 for a list of watersheds and proximity to anadromous habitat). All other Project Elements (besides water drafting) would occur in the above-listed sixteen 7th-field watersheds, and potential effects would be minimized through adhering to the effects minimization measures contained in the programmatic consultations listed above. Guidelines, criteria, and effects minimization measures contained in the above-listed programmatic consultation documents for Project Elements (hazard tree removal, haul route maintenance, road closure, fuels reduction actions) are incorporated into the project design and would result in negligible effects at the 7th-field scale on anadromous salmonids and their habitat and no effects at the 5th-field watershed scale.

Habitat Indicators That Will Not Be Affected by Water Drafting

As mentioned above, potential direct and indirect effects from all Project Elements, with the exception of mechanical thinning (which was determined to have no direct or indirect effects on anadromous fish or their habitat), were analyzed in the above-listed programmatic consultation documents. Although water drafting was also analyzed in those programmatic documents, it is

analyzed in this BA/BE, as well, and is documented in a tiering form contained in Appendix H). Specific effects minimization measures for Project Elements that fall under existing programmatic consultations were incorporated into the Eddy Gulch LSR Project design and therefore require no further analysis herein; nonetheless, project tiering forms are required for these Project Elements and are also contained in Appendix H.

The remaining analysis of effects is focused on water drafting and is organized by habitat Indicators. As mentioned earlier, the fisheries analysis uses key indicators of habitat quality (habitat Indicators) as identified through the Analytical Process (USDA-USDOC-USDI 2004).

The following habitat Indicators would be affected by water drafting and are analyzed in this BA/BE:

- Water Quality—Chemical Contamination
- Habitat Access—Physical Barriers
- Water Quality and Habitat Elements—Suspended Sediment-Substrate Character
- Streambank Conditions
- Floodplain Connectivity
- Refugia
- Flow/Hydrology—Change in Peak/Base Flow
- Watershed Condition—Riparian Reserves

The following habitat Indicators would not be affected by water drafting and are therefore not analyzed further in this BA/BE:

- Large woody debris
- Pool frequency and quality
- Large pools
- Off-channel habitat
- Increase in drainage network
- Road density and location
- Disturbance history

Direct Effects

Proximity and Probability. The distribution of coho salmon and Chinook salmon are over-estimated in this analysis because the distribution of steelhead was used as the basis for analysis of potential effects on salmonids and their habitat. The only proposed activity occurring in habitat used by anadromous fish is water drafting for dust abatement along project roads. Based on the fish distribution map and the location of proposed water drafting sites within habitat accessible by anadromous salmonids, there is potential for direct effects on anadromous fish in the following streams (refer to Figure C-2 in Appendix C): Crawford Creek (1 site), Mathews Creek (1 site), North

Fork Salmon River (1 site), North Russian Creek (3 sites), Shadow Creek (1 site), South Russian Creek (1 site), South Fork Salmon River (1 site), and Whites Gulch (1 site).

The potential direct effects associated with water drafting include entraining and/or impinging juvenile fish on intake pump screens. However, there is a very low probability of entrainment or impingement of juvenile fish due to low pumping rate volumes (not to exceed 350 gallons/minute or 10 percent of the flow of the stream at the drafting site). This low pumping rate volume would allow fish to swim away from intakes/screens, and fleeing intake pumps is the natural instinct of fish. Direct effects would be minimized to a negligible level through implementation of NMFS (2001) water drafting guidelines, which are required resource protection measures, and include but are not limited to the following: (1) drafting will not reduce the stream flow in anadromous fish-bearing reached by more than 10 percent; (2) when water is drafted from anadromous fish-bearing reaches, intakes will be screened with 3/32-inch mesh (for rounded or square screen openings) or 1/16-inch mesh for slotted openings; (3) pumping rate will not exceed 350 gallons per minute or 10 percent of the flow of the anadromous fish-bearing stream; and (4) pumping will be terminated when tank is full to prevent erosion at the streambank.

By following these specifications, considering the mobility and instincts of fish, and the unlikelihood of entrainment or impingement of fish, the effects of water drafting in anadromous fish-bearing reaches is discountable (extremely unlikely to occur) and will have insignificant (not meaningfully measured, detected, or evaluated) negative direct effects on coho salmon, Chinook salmon, and steelhead behavior or their habitats (including critical habitat and Essential Fish Habitat), with no long-term direct effects. Water drafting in non-anadromous reaches would have no direct effects on anadromous fish.

Indirect Effects

As mentioned above, the potential indirect effects from all Project Elements, with the exception of mechanical thinning (which was determined to have no direct or indirect effects on anadromous fish or their habitat), were analyzed in the above-listed programmatic consultation documents. Specific effects minimization measures for Project Elements that fall under existing programmatic consultations were incorporated into the Eddy Gulch LSR Project, and therefore, all Project Elements (except water drafting) require no further analysis herein; nonetheless, project tiering forms are required for these Project Elements (see Appendix H).

The remaining analysis of indirect effects is focused on water drafting and is organized by habitat Indicators. As mentioned earlier, the fisheries analysis uses key Indicators of habitat quality (habitat Indicators) as identified through the Analytical Process (USDA-USDOC-USDI 2004). The following are the habitat Indicators relevant to water drafting:

- Water Quality: Stream Temperature, Chemical Contamination
- Habitat Access: Physical Barriers
- Water Quality and Habitat Elements: Suspended Sediment and Substrate Character, Streambank Condition, Floodplain Connectivity, Refugia
- Flow/Hydrology: Change in Peak/Base Flow
- Watershed Condition: Riparian Reserves

Habitat Indicator: Water Quality—Stream Temperature

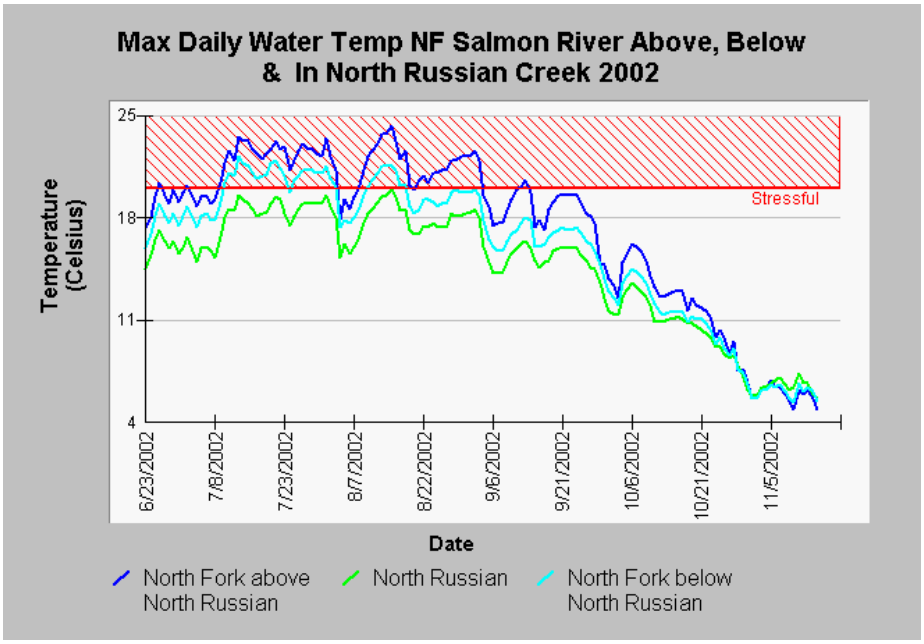
Existing Conditions

7th-Field Watersheds. The 7th-field streams in the Action Area and their associated small, low-flow perennial cold seeps and springs collectively feed anadromous habitat downstream in 5th-field watershed streams. Cool water temperatures in 7th-field streams are crucial for providing cool water inflows to warmer anadromous habitat downstream of the LSR that are used by anadromous salmonids, including within the North Fork and South Fork of the Salmon River.

All of the 7th-field watersheds in the Eddy Gulch LSR have stream temperatures that are considered "properly functioning." In addition to previous data collected by the KNF for all 7th-field streams, some streams were sampled during the summer of 2008. The mainstem reaches of Whites Gulch and Shadow Creek measured 59 degrees Fahrenheit (°F) in mid-August. Temperatures sampled in mid-July were as follows: Mathews Creek–62.5°F, South Music–61°F, Taylor Creek–55.5°F, and Russian Creek–55.5°F. During field reviews of the Action Area in mid-August 2008, water temperatures were measured in numerous seeps and springs that flowed into Whites Gulch, South Music, and Sixmile creeks, and temperatures ranged from 46.5°F to 57°F.

Figure 1 shows the maximum daily water temperatures in 2002 of North Russian Creek and the North Fork Salmon River above and below North Russian Creek—the water temperatures in the North Fork Salmon stayed above levels stressful to Salmonids for almost the entire summer, but North Russian Creek stayed below stressful levels for the entire summer. North Russian Creek did have a cooling influence on the water temperature in the North Fork Salmon River below North Russian Creek.

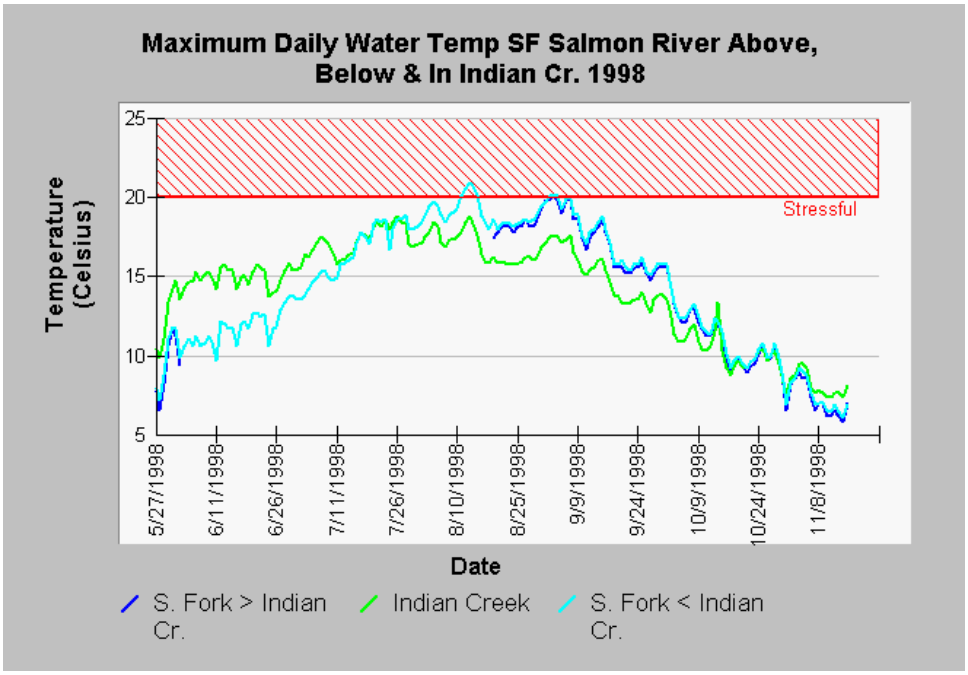
FIGURE 1. Maximum daily water temperatures in 2002 of North Russian Creek and the North Fork Salmon River above and below North Russian Creek.



Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sa_c49.htm)
Note: 25 degrees Celsius (°C) = 77°F; 18°C = 64°; 11°C = 52°F; 4°= 39°

Figure 2 shows the maximum daily water temperatures during the summer of 1998 in the South Fork Salmon River above, below, and in Indian Creek. Indian Creek was warmer than the South Fork Salmon River until mid-July, and then was noticeably cooler during the hottest period of the summer. Although its water was cooler, Indian Creek did not seem to have a cooling influence on the water temperature in the South Fork Salmon River. This may suggest that Indian Creek was not of sufficient size to influence the South Fork Salmon. The mouth of Indian Creek did provide a cold water refugia for Salmonids during the summer temperature peak. Data are missing between June 2 and August 24, 1999, in the South Fork Salmon River above Indian Creek.

FIGURE 2. Maximum daily water temperatures during the summer of 1998 in the South Fork Salmon River above, below, and in Indian Creek.

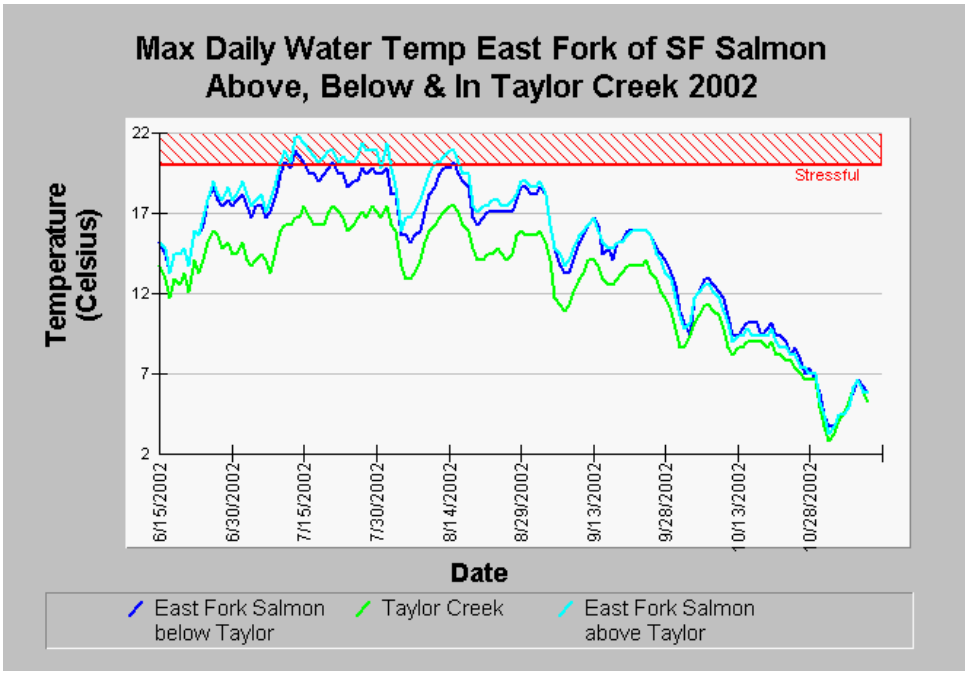


Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sa_c35.htm

Note: 25°C = 77°F; 20°C = 68°F; 15°C = 59°F; 10°C = 50°F; 5°C = 41°F

Figure 3 shows the maximum daily water temperatures in 2002 of the East Fork of the South Fork Salmon River above, below, and in Taylor Creek. Temperatures were above the stressful limit for Salmonids during much of July and part of August in the East Fork above Taylor Creek. Taylor Creek appeared to have a cooling influence on the East Fork during the peak of summer heat.

FIGURE 3. Maximum daily water temperatures in 2002 of the East Fork of the South Fork Salmon River above, below, and in Taylor Creek.



Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sa_c58.htm

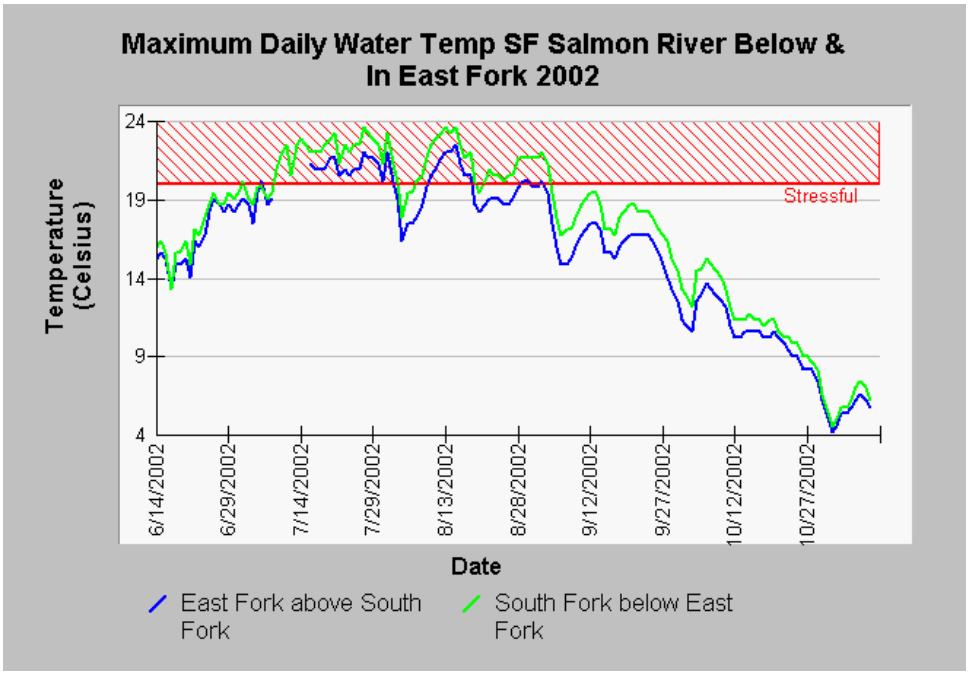
Note: 22°C = 72°F; 17°C = 63°F; 12°C = 54°F; 7°C = 45°F; 2°C = 36°F

5th-Field Watersheds. Shade is lacking along the entire North Fork of the Salmon River, with the exception of the upper-most reaches. Tributary temperatures were below lethal levels and from 39°F to 43°F lower than the mainstem. The Little North Fork had the largest cooling effect on the North Fork of the Salmon River due to its significant flow contribution. The North Fork of the Salmon River exceeds maximum recommended temperatures (below 70°F) during the summer. High water temperatures have resulted in fish kills of spring-run Chinook salmon and summer steelhead during warm low-flow drought conditions of some summer seasons, such as in 1994.

Both the North and South Fork of the Salmon River largely influence stream temperatures in the mainstem Salmon River. Water quality, including water temperature, is a concern in the Salmon River basin. Cool, deep pools in the lower Salmon River are critical for summer holding and rearing salmonids. Summer water temperatures have had sustained average seven-day maximum temperatures in excess of 81°F during low flows of drought years, which exceeds the tolerable and preferred ranges of salmonids.

Figure 4 shows maximum daily water temperatures during the summer of 2002 in the East Fork Salmon River above its confluence with the South Fork and the South Fork Salmon River below the confluence. The East Fork is cooler than the South Fork, although temperatures reached stressful levels for Salmonids at both sites in July and August.

FIGURE 4. Maximum daily water temperatures during the summer of 2002 in the East Fork Salmon River above its confluence with the South Fork and the South Fork Salmon River below the confluence.

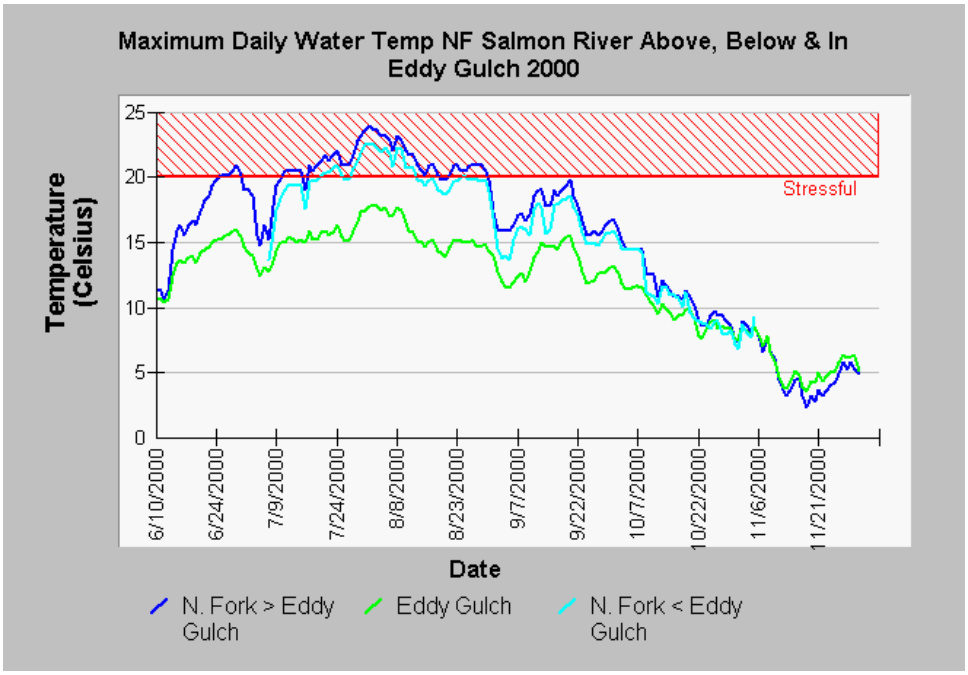


Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sa_c46.htm

Note: 24°C = 75°F; 19°C = 66°F; 14°C = 57°F; 9°= 48°; 4°C = 39°F

Figure 5 shows the maximum daily water temperatures during the summer of 2000 in the North Fork Salmon River above, below, and in Eddy Gulch. Mid-summer water temperatures became stressful for Salmonids in the North Fork Salmon but not in Eddy Gulch. Although the water in Eddy Gulch remained much cooler, it did not seem to have much of a cooling influence on the North Fork, which suggests Eddy Gulch may not be large enough to noticeably affect the temperature of the North Fork Salmon. However, collectively or cumulatively, 7th-field watersheds in the Action Area are crucial for providing high-quality water to mainstem rivers.

FIGURE 5. Maximum daily water temperatures during the summer of 2000 in the North Fork Salmon River above, below, and in Eddy Gulch.

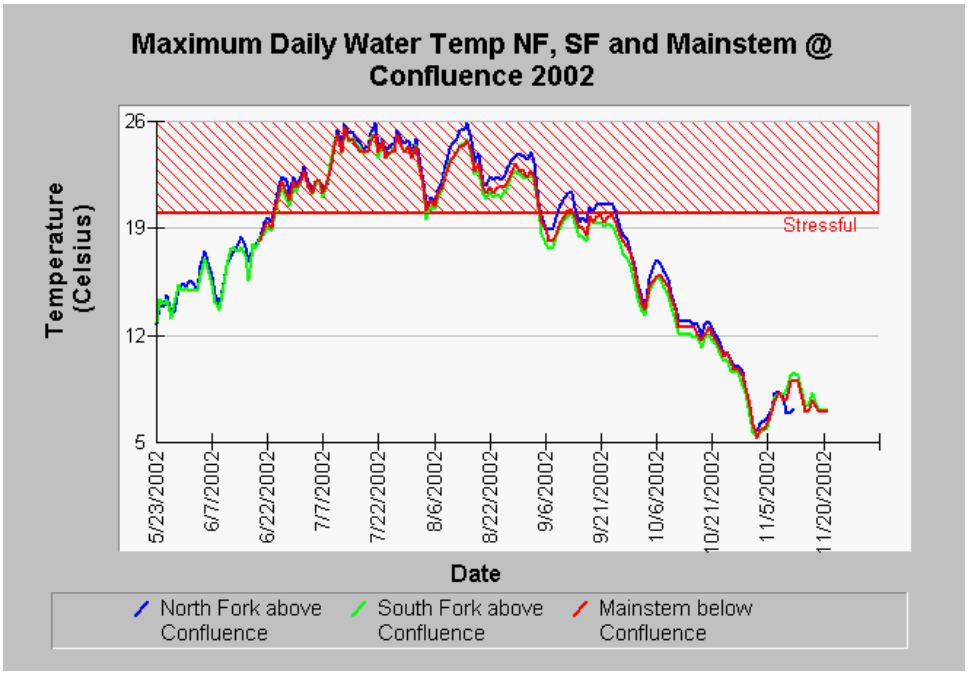


Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sa_c46.htm

Note: 25°C = 77°F; 20°C = 68°F; 15°C = 59°F; 10°C = 50°F; 5°C = 41°F

Figure 6 shows the maximum daily water temperatures during the summer of 2002 in the North Fork Salmon and South Fork Salmon rivers above their confluence with the mainstem and of the mainstem below their confluence. From late June through early September, all three locations were in the temperature range stressful to salmonids.

FIGURE 6. Maximum daily water temperatures during summer of 2002 of the North Fork and South Fork of the Salmon River above their confluence with the mainstem and of the mainstem below their confluence.

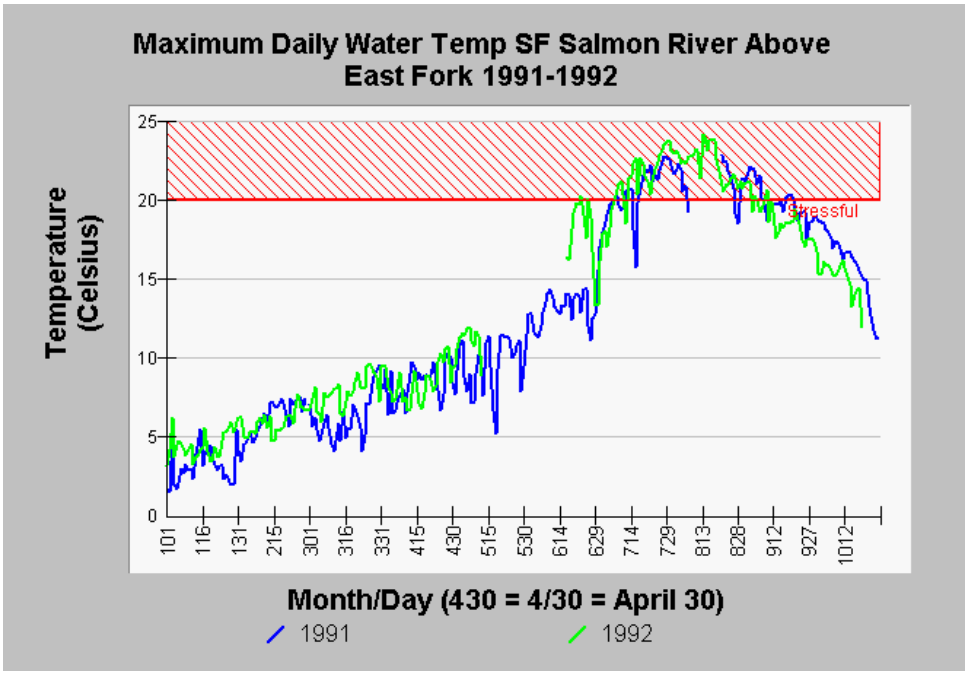


Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sa_c46.htm

Note: 26°C = 79°F; 19°C = 66°F; 12°C = 54°F; 5°C = 41°F

Figure 7 shows the maximum daily water temperatures in 1991 and 1992 of the South Fork Salmon River above the East Fork. Stream temperatures from late June to early September were in the range stressful to Salmonids for at least some period of the day.

FIGURE 7. Maximum daily water temperatures in 1991 and 1992 of the South Fork Salmon River above the East Fork.



Source: Temperature data from http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/ sa_c46.htm

Note: 25°C = 77°F; 20°C = 68°F; 15°C = 59°F; 10°C = 50°F; 5°C = 41°F

Post-Project Conditions

Proximity and Probability. Nine water drafting sites are within the following fish-bearing streams: Lower North Russian Creek (3), Upper North Russian Creek, Robinson-Rattlesnake Creek, Crawford Creek, Shadow Creek, Whites Gulch, and Cody-Jennings Creek. The water drafting sites have existing access but may be rocked to reduce surface erosion of dirt roads. Water drafting will be done in accordance with NMFS's *Water Drafting Specifications* (USDC NMFS 2001), which limits the amount and rate at which water can be withdrawn during pumping and requires pumps to be screened to meet NMFS specifications. By following NMFS specifications, the magnitude of flow decrease due to drafting would be undetectable and would not change instream water temperatures.

Magnitude. The stream temperature habitat Indicator would be maintained in anadromous reaches at the site scale, 7th-field and 5th-field stream scales, and over the entire Action Area. Water drafting would have a neutral effect on this habitat Indicator (Water Quality–Stream Temperature).

Habitat Indicator: Water Quality—Chemical Contamination

Existing Conditions

No *Clean Water Act* 303d-listed reaches occur in the Action Area. Chemical contamination has not been identified, and no persistent sources of contamination are known.

Post-Project Conditions

Proximity and Probability. Sources of chemical contamination from water drafting include fuel or oil spills associated with water trucks and pumps. Refueling and maintenance of motorized equipment will occur at least 200 feet from stream channels. BMP 2.12 directs all fueling and lubricating activities and includes fuel containment requirements. Given these resource protection measures, the likelihood of a spill affecting water quality would be low.

Magnitude. No effects are expected at the site scale or the 7th-field or 5th-field stream/watershed scales. Water drafting would have a neutral effect on this habitat Indicator (Water Quality—Chemical Contamination).

Habitat Indicator: Habitat Access—Physical Barriers

Existing Conditions

All of the 7th-field streams are rated as "properly functioning" for man-made barriers with the exception of Whites Gulch. Whites Gulch has an historic water diversion that has recently been modified to allow fish passage. A county-maintained road / stream crossing near the mouth of Whites Gulch creates a fish passage barrier—removal of this barrier is planned for 2010.

Post-Project Conditions

Proximity and Probability. Water drafting has the potential to affect migration passage due to withdrawal of water from streams. Due to implementation of NMFS (2001) guidelines for water drafting, which allow only 10 percent or less of streamflow to be drafted, barriers to migration would not be created. Note that resource protection measures (BMP 1.1) address installation of wood and plastic check dams to impound water in small creeks used for drafting. However, installation of impoundments for any purpose would not be allowed in fish-bearing reaches.

Magnitude. No effects are expected at the site, 7th-field, or 5th-field stream/watershed scale. Water drafting would have a neutral effect on this habitat Indicator (Habitat Access—Physical Barriers).

Habitat Indicator: Water Quality and Habitat Elements—Suspended Sediment-Substrate Character

Existing Conditions

The KNF rates many of the 7th-field watersheds in the Eddy Gulch LSR as being "at risk" for the sediment indicator, which means that the amount of fine sediment was higher than desired, and/or cobble embeddedness was 20 percent or greater, or watersheds had relatively high CWE ratings. Crawford Creek and Black Bear Creek were rated at "properly functioning" for sediment. The following watersheds were rated as "at risk" for watershed disturbance history (refer to the tables in Appendix G): Shadow Creek, Taylor Creek, Crawford Creek, Mathews Creek, Black Bear Creek,

Upper North Russian Creek, Lower North Russian Creek, Lower South Russian Creek, Whites Gulch, and Eddy Gulch.

The CWE model, USLE component, identified two 7th-field watersheds as being near or over threshold (see tables in Appendix G) for sediment delivery from surface runoff: Eddy Gulch (risk ratio = 1.05) and Shadow Creek (risk ratio = 0.94). All other 7th-field watersheds have risk ratios between 0.24 and 0.56, indicating that these watersheds meet the desired condition. The GEO component identifies four 7th-field watersheds with potential concerns over landslide-related sediment delivery: Upper North Russian Creek (risk ratio = 0.87), Indian Creek (risk ratio = 0.87), Eddy Gulch (risk ratio = 0.79), and Kanaka-Olsen Creek (risk ratio = 1.53).

Limited field surveys were done in Shadow and Crawford creeks. Sediment observed was not fine sediment (ordinarily defined as particles 2 millimeters [0.08 inch] or less) but rather unconsolidated, poorly sorted mix of coarse sand and fine gravel up to approximately 1 centimeter (0.4 inch) in diameter. Silt and clay fractions were minimal. Also, much of the fines were not accumulated in pool tails but occurred, instead, downstream of mid- and side-channel boulders. The slightly elevated values for V* (stored sediment volume in pools) observed can be misleading since a high proportion of the “fines” were coarser than 2 millimeters. Rather than being a detriment to spawning habitat, these unconsolidated deposits can provide spawning habitat in channels otherwise dominated by cobble-size particles—much too large to serve as spawning substrate for resident trout. These data are consistent with qualitative assessments of other 7th-field tributaries at road crossings and other access points. In-channel evidence for large amounts of fine sediment was not present. The 7th-field tributaries are high-gradient transport channels that are likely carrying sediments through to alluvial reaches and mainstem channels.

The water quality of 7th- and 5th-field streams is, overall, very good. Turbidity is low, except in response to intense precipitation during winter periods or during summer thunderstorm events.

Refer to the checklists in Appendix B for more detailed information on habitat conditions in the subject watersheds.

Post-Project Conditions

Proximity and Probability. Water drafting would occur at existing sites within anadromous streams. Site maintenance would be limited to actions that are needed to reduce erosion; those actions include rocking, erosion control to prevent water spillage from gullying towards creeks, and placement of straw bales or containment dikes. No new access roads would be built. Due to implementation of erosion-control measures, increases in sedimentation to streams are not expected to occur.

Magnitude. Sediment disturbance from water drafting sites is expected to be insignificant and undetectable. No effects are expected at the site scale or 7th-field and 5th-field stream/watershed scales. Water drafting would have a neutral effect on this habitat Indicator (Water Quality and Habitat Elements—Suspended Sediment and Substrate Character).

The sediment filtration capacity of Riparian Reserves would be maintained, and existing habitat conditions (water quality and riparian function) would also be maintained. Water drafting would not add cumulatively to existing, ongoing, or future impacts. Post-project forest health improvements, as

well as reduced risk of high-intensity fires in the Action Area, represent a long-term benefit to the sediment Indicator, including suspended sediment, turbidity, and substrate character.

Habitat Indicator: Streambank Conditions

Existing Conditions

Based on field reviews, streambank conditions in all 7th- and 5th-field watersheds, with the exception of Black Bear Creek, are properly functioning. Black Bear Creek is rated as "at risk" due to moderately high road density in the watershed.

Post-Project Conditions

Proximity and Probability. Water drafting has the potential to affect streambank conditions if new sites and/or new road access are developed; however, only existing water drafting sites would be used for the project, and no vegetation removal will be allowed at drafting sites with the exception of vegetation trimming done in such a way that existing vegetation and associated root strength along stream banks and access routes are maintained. Water drafting would not affect this habitat Indicator (Streambank Conditions).

Magnitude. No effects are expected at the site scale or 7th- or 5th-field stream/watershed scales. Water drafting would have a neutral effect on this habitat Indicator (Streambank Conditions).

Habitat Indicator: Floodplain Connectivity

Existing Conditions

Floodplains are not a significant component in these mountainous Rosgen type A and B stream channels in 7th-field watersheds, and streams exhibit fairly similar morphological characteristics. These characteristics include high-gradient (4–10 percent), boulder–cobble substrates and summer maximum water temperatures below 60°F. Pools are relatively small due to the role of boulders in the creation of step-pool reaches. The extent of response reaches, which are low-gradient reaches that would typically store sediment in the subject 7th-field watersheds, is extremely limited or absent.

Post-Project Conditions

Proximity and Probability. Project implementation would not change floodplain connectivity in the Action Area. Water drafting would not affect floodplains because only existing developed sites would be used for the project. There would be no effect on this habitat Indicator (Floodplain Connectivity).

Magnitude. No effects are expected at the site, 7th- or 5th-field stream / watershed scale. Water drafting would have a neutral effect on this habitat Indicator (Floodplain Connectivity).

Habitat Indicator: Refugia

Existing Conditions

The Northwest Forest Plan identified Key Watersheds in order to create a system of large refugia comprised of watersheds that are crucial to at-risk fish species and to provide high-quality water (Record of Decision on the Northwest Forest Plan, B-12). The Salmon River watershed is a designated Key Watershed (USDA Forest Service 1995a), with its attendant management guidelines

aimed at preserving aquatic and riparian habitats for anadromous salmonids and other riparian-dependent species.

The 7th-field streams serve as thermal refugia for anadromous salmonids by providing cool inflows to downstream habitats and are considered a primary constituent element relative to refugia. Refer to the stream temperature discussion given above.

Post-Project Conditions

Proximity and Probability. Water drafting would be done in accordance with NMFS *Water Drafting Specifications* (USDC NMFS 2001), which limits the amount and rate at which water can be withdrawn during pumping and requires pumps to be screened. By following NMFS specifications, the magnitude of flow decrease due to drafting would be undetectable and would not change instream water temperatures.

Magnitude. The effect of water drafting on stream temperatures, and therefore refugia, would be neutral. The stream temperature habitat Indicator and refugia Indicator would both be maintained in anadromous reaches at the site scale, 7th- and 5th-field stream scales, and over the entire Action Area.

Habitat Indicator: Flow/Hydrology—Change in Peak/Base Flow

Existing Conditions

The current pre-project peak / base flow conditions were rated as “properly functioning” for all of the subject watersheds.

Post-Project Conditions

Proximity and Probability. Impervious surface can be created through soil disturbance and compaction and from the creation of hydrophobic soils. When sufficient impervious surface has been created within a watershed, a higher proportion of storm and snowmelt runoff is manifest as surface runoff. A smaller proportion infiltrates into the soil, taking slower paths to stream channels. This results in higher peak flows for each unit of precipitation or snowmelt. When these conditions persist, it represents a shortening of flood return intervals. A fundamental shift in the frequency of channel-shaping flood events can produce an increased potential for channel scour. Where impervious surfaces are created in near-stream areas, these effects can be disproportionately higher. Water drafting would not increase the amount of impervious surfaces in the Action Area because existing sites would be used, approaches are currently rocked or would be rocked; thus, drafting sites would not affect the peak flow habitat Indicator.

At the site level, water drafting has the potential to create short-term decreases in base flows. Pumping rate volumes would not exceed 10 percent of the flow of any anadromous stream subject to water drafting, and drafting would be done in short-time intervals (for example, six trips per day to a site and drafting for 20-minute intervals). Thus, water drafting would result in a 10 percent reduction in flow at the site level for up to 20 minutes per time. The effects of water drafting would be negative but insignificant on this habitat Indicator (Flow/Hydrology—Change In Peak/Base Flow).

Magnitude. Insignificant effects on base flows are expected at the site scale and in the short term, and effects would be neutral in the long term. No short-term or long-term effects are expected at the 7th- or 5th-field stream / watershed scales.

Habitat Indicator: Watershed Condition—Riparian Reserves

Existing Conditions

Riparian Reserves were established in each watershed around areas that are directly coupled to streams or rivers. The reserves generally parallel the stream network but were established to maintain hydrologic, geomorphic, and ecologic processes and, as such, include other areas necessary for maintaining these processes. The widths of the reserves are one site-potential tree height (340 feet) on each side of fish-bearing streams. The reserves are managed under special Standards and Guidelines that prohibit and regulate forest management activities that would otherwise retard or prevent attainment of Aquatic Conservation Strategy Objectives. The reserves are a key element designed to maintain and restore riparian structure and function and provide connectivity corridors among LSRs.

Many of the streams in the Eddy Gulch LSR have narrow, deeply incised channels with a minor component of obligate riparian vegetation. Debris torrents and channel scour associated with flood events are common occurrences and periodically reset streamside vegetation. Willow, big leaf maple, and alder colonize these disturbed areas and are critical for recovery of riparian function and for input of nutrients. Conifers provide the primary overstory in Riparian Reserves and provide shade, large wood, and root stability. The LSR has a number of acres that are on south- and west-facing slopes with shallow soils and hot, dry conditions, which are not conducive to dense coniferous stands. There are 8,624 acres of Riparian Reserves in the Eddy Gulch LSR.

Post-Project Conditions

Proximity and Probability. Water drafting has the potential to affect Riparian Reserves if new road access or drafting sites are developed; however, only existing sites will be used for the project, and no vegetation removal will be allowed at drafting sites with the exception of vegetation trimming done in such a way that existing vegetation and associated root strength along stream banks and access routes are maintained. Water drafting would not affect this habitat Indicator (Watershed Condition—Riparian Reserves).

Magnitude. No effects are expected at the site scale or 7th- or 5th-field stream / watershed scales. Water drafting would have a neutral effect on this habitat Indicator.

Differences in Effects for Each Alternative

The number of existing water drafting sites proposed for use is the same under both action alternatives; therefore, the potential effects for Alternative B and C would be the same.

VI. Cumulative Effects—Endangered Species Act

The ESA defines cumulative effects in 50 CFR 402.02 as “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.”

Eddy Gulch LSR includes 60,331 acres of KNF lands and 2,323 acres of private lands. Within the LSR, there are approximately 178 miles of streams on KNF lands that provide habitat for steelhead and resident trout and 7.8 miles of streams on private lands that provide habitat for steelhead and resident trout. Reasonably foreseeable future actions on these private lands include fuels reduction projects. These actions have a low potential to increase sedimentation into these streams because they would likely consist of underburning and removal of small-diameter trees for fuels reduction near existing communities and along access roads.

The Project Elements that fall under existing programmatic consultations were analyzed previously and determinations of "not likely to adversely affect" salmonids or their habitat included consideration of potential CWEs. This analysis incorporates the programmatic analyses by reference, as well as any foreseeable future nonfederal actions as described in the environmental impact statement for the Eddy Gulch LSR Project and summarized below. The Project Elements that have no effect would not contribute incrementally to ongoing project effects. Water drafting would not contribute cumulatively to other effects because effects would be small, dispersed, and of short duration and, therefore, insignificantly negative at the site scale and 7th- and 5th-field watershed scales.

VII. Cumulative Effects—National Environmental Policy Act

The KNF Schedule of Proposed Actions was reviewed to identify current and reasonably foreseeable future projects on the Salmon River and Scott River Ranger Districts that should be included in the cumulative effects analysis for the Eddy Gulch LSR Project. Ongoing projects include annual road maintenance, improvements to existing mining claims, hiking, and appropriate responses for fire suppression. Additional future projects include the following:

1. Installing telephone and fiber-optic lines through the Ranger District (this involves digging a trench adjacent to roads to bury the lines and installing access points for future maintenance activities).
2. North Forks road maintenance project (this involves storm proofing 76 miles of road requiring blading, improving road drainage, and protecting riparian and stream systems; decommissioning 36 miles of roads to reduce sediment delivery to streams; and adding 2.4 miles of existing road).
3. Construction of a fuelbreak system west of Black Bear Ranch (approximately 700 acres of ridgetop fuel reduction).
4. A small amount of projects on private lands have been funded under the Salmon River CWPP. This includes funding to treat 75 acres of fuels on private properties in and around the Eddy Gulch LSR Project Assessment Area in the next 18 months. There may be additional funding for at least 50 acres in the following 18 months.

The CWE modeling represents an analysis of aggregated effects on sedimentation. Based on this analysis, Table 6 lists the results of CWE analysis for watersheds in the LSR under Alternatives B and C, along with foreseeable future projects, such as the North Fork roads maintenance project. Alternative C was modeled separately but produced identical risk ratios because of the very small differences between the alternatives. The risk ratios reported for 2009 represent existing conditions plus foreseeable future actions (North Fork roads maintenance project). The values reported for 2014

represent conditions at a point in time when all mechanical treatments are projected to be complete. The values reported for 2021 represent the point in time when all treatments have been implemented. The proposed North Fork Salmon River Roads Project was modeled as a reasonable foreseeable future action that proposes to stormproof and decommission roads in the Salmon River watershed. This action is assumed to be completed by 2014.

TABLE 6. CWE model results for Eddy Gulch LSR Project 7th-, 6th-, and 5th-field subwatersheds. Modeled with the North Fork Roads Project.

Watershed	USLE Component			ERA Component			GEO Component		
	2009	2014	2021	2009	2014	2021	2009	2014	2021
7th-field Watersheds									
Black Bear Creek	0.39	0.50	0.39	0.32	0.32	0.18	0.44	0.42	0.39
Cody-Jennings Creek	0.41	0.41	0.41	0.24	0.20	0.16	0.49	0.47	0.43
Crawford Creek	0.46	0.47	0.46	0.22	0.29	0.20	0.29	0.28	0.27
Eddy Gulch	0.90	0.91	0.90	0.32	0.35	0.33	0.62	0.61	0.60
Gooey-Ketchum Creek	0.26	0.26	0.26	0.12	0.12	0.11	0.50	0.50	0.50
Gould-East Fork South Fork Salmon River	0.35	0.35	0.40	0.16	0.17	0.21	0.45	0.45	0.45
Indian Creek	0.53	0.53	0.53	1.04	0.59	0.24	0.87	0.78	0.66
Kanaka-Olsen Creek	0.15	0.15	0.15	0.27	0.17	0.10	1.43	1.18	0.90
Lower North Russian Creek	0.21	0.22	0.21	0.15	0.16	0.15	0.41	0.41	0.41
Lower South Russian Creek	0.30	0.31	0.30	0.42	0.40	0.31	0.36	0.35	0.34
Matthews Creek	0.42	0.43	0.42	0.15	0.16	0.15	0.47	0.46	0.46
Robinson-Rattlesnake Creek	0.21	0.21	0.21	0.16	0.13	0.13	0.32	0.31	0.31
Shadow Creek	0.93	0.96	0.97	0.18	0.29	0.25	0.41	0.41	0.41
Sixmile Creek	0.52	0.52	0.52	0.12	0.12	0.13	0.36	0.36	0.36
Tanner-Jessups Creek	0.34	0.34	0.34	0.46	0.37	0.32	0.41	0.39	0.38
Taylor Creek Creek	0.23	0.23	0.23	0.14	0.14	0.13	0.15	0.15	0.15
Timber-French Creek	0.24	0.24	0.24	0.14	0.12	0.10	0.31	0.31	0.30
Upper North Russian Creek	0.27	0.30	0.27	0.26	0.37	0.23	0.60	0.59	0.58
Whites Gulch	0.28	0.29	0.28	0.13	0.14	0.12	0.19	0.17	0.17
6th-field Watersheds									
Cecilville-Crawford Creek	0.37	0.35	0.34	0.20	0.20	0.15	0.36	0.35	0.33
Main East Fork South Fork Salmon River	0.38	0.38	0.39	0.13	0.16	0.15	0.29	0.29	0.29
North Russian Creek	0.24	0.25	0.24	0.18	0.21	0.16	0.35	0.35	0.34
Plummer-Black Bear Creek	0.23	0.26	0.24	0.25	0.21	0.13	0.41	0.38	0.35
South Russian Creek	0.15	0.16	0.15	0.16	0.14	0.10	0.16	0.15	0.14
Whites-Jackass Creek	0.39	0.39	0.39	0.21	0.19	0.18	0.35	0.34	0.33
5th-field Watersheds									
North Fork Salmon River	0.15	0.13	0.13	0.20	0.16	0.11	0.48	0.41	0.34
South Fork Salmon River	0.29	0.28	0.28	0.26	0.23	0.17	0.38	0.36	0.33

Of all the 7th-field watersheds in the analysis, only Kanaka-Olsen Creek has risk ratios over 1.0, and that represents the current condition (GEO=1.53). By 2014 CWE modeling shows that risk ratios are declining due to vegetative recovery. Increases in risk ratios due to project activities are very small. As an example, Shadow Creek, which contains the largest area of mechanical treatments, would increase from USLE=0.93 to 0.97 by project conclusion in 2021. All other watersheds would have risk ratios that hold static or decline over the period of project implementation.

Under existing conditions, none of the 5th- or 6th-field subwatersheds are over threshold for surface soil erosion, mass-wasting, or equivalent roaded area, and project activities would not change that situation.

The modeled foreseeable future action (North Fork roads maintenance project) brought the Eddy Gulch 7th-field USLE risk ratio below threshold (USLE = 1.05 to 0.90) and lowered the Kanaka-Olsen 7th-field GEO risk ratio (GEO = 1.53 to 1.43).

Project activities would not result in any watershed going over threshold nor would they create any major increases in risk ratios. At project conclusion, most risk ratios would be at levels equal to or less than those that currently exist. The project is expected to result in reduced risk ratios over the long term by reducing the risk of stand-replacing wildfire. There are no expected long-term cumulative effects on water quality or aquatic habitat or populations. It is expected that habitat quality would be improved in the long term as a result of project implementation.

Effects of the proposed project on anadromous fish and their habitat, when combined with other proposed projects, would be insignificantly negative, and in the long term, effects would be positive due to reduction in fire risk.

VIII. Viability

Chinook salmon and steelhead trout are listed as Forest Service Sensitive species in Region 5. Implementation of the KNF LRMP Standards and Guidelines, which are designed to reverse the trend of habitat degradation, as well as address long-term persistence of late-successional-dependent species, would primarily contribute towards species viability. Overall, implementation of the project would help maintain the health of forested ecosystems by increasing watershed health and thereby reducing the risk of sedimentation into stream channels, lowering the risk of watershed impacts associated with stand-replacing fire, including surface erosion, landsliding, loss of riparian vegetation, channel sedimentation, and altered flow regimes.

The project design and resource protection measures would minimize or prevent adverse effects on aquatic species (including anadromous salmonids) and their habitat at the site scale and minimize effects on these species downstream at the 7th- and 5th-field watershed scales. A trend towards listing under the ESA is not anticipated, and viability is not at risk relative to the project because short-term effects on aquatic habitat would be insignificant, the project meets Standards and Guidelines, and the project would not negatively affect anadromous fish habitat in the long term.

IX. Species and Habitat—Summary

Direct Effects. Water drafting would be implemented according to NMFS (2001) water drafting specifications, which would minimize the potential for direct and indirect effects. However, drafting may alter the behavior of fish in the vicinity of drafting sites and temporarily decrease base flows in a localized area while a truck is drafting. NMFS (2001) drafting specifications will ensure that flows are not reduced by more than 10 percent to protect any fish that may be in the vicinity. Therefore, water drafting may affect but would “not likely adversely affect” anadromous salmonids.

Indirect Effects. All habitat Indicators would be maintained at the site scale and 7th- and 5th-field scales. Project Elements would either have no effect or would have been minimized to result in "not likely to adversely affect" determinations through previous consultations, and those effects minimization measures have been incorporated into this project. Water drafting is "not likely to adversely affect" anadromous fish or their habitat due to adherence to NMFS (2001) guidelines and because existing water drafting sites will be used.

X. Project Elements and Effects Summary

The Eddy Gulch LSR Project Elements are given below and effects are summarized (see Table 7).

1.) Project Elements that would have no effect on salmonids or their habitat in the Action Area.

Mechanical Units. Intermittent channels that occur in proposed mechanical units would be protected by a 170-foot Riparian Reserve on each side of each channel. Ephemeral Riparian Reserves are variable, depending on the feature to be protected and would similarly protect these channels. Tractor yarding equipment will stay out of Riparian Reserves in every M Unit, and units are not located in close proximity to anadromous salmonid habitat. If any sediment is generated from localized soil displacement, it is expected that its potential impacts would be addressed through BMPs. If any sediment is generated from localized soil displacement and is inadvertently not treated through BMPs, it would be expected to be a negligible amount due to project design, resource protection, and impact avoidance measures described above. This potential negligible amount of sediment would not be expected to be delivered to anadromous streams because units are located on ridgetops, and any units with Riparian Reserves would not deliver sediment downstream because intact vegetation and soil cover in the reserves are expected to function to retain sediment. Many M Units do not have Riparian Reserves nearby. This Project Element would have a neutral effect on Suspended Sediment / Turbidity, Substrate, Peak / Base Flows, Disturbance History, Riparian Reserves, Large Woody Debris, and all other Indicators.

Project Element: Road-Related Activities

Temporary Road Construction. No new *authorized* (National Forest System) roads would be constructed. Construction of 1.03 miles of new temporary roads would have no effect on salmonids or their habitat because (1) all road segments are on ridgetop locations distant from salmonid habitat; (2) proposed new temporary roads do not cross Riparian Reserves; (3) new temporary roads would be outsloped where necessary to reduce erosion, covered with slash, if needed, and blocked after each harvest season and prior to winter storms, and then closed by the end of the project; and (4) none of the new temporary roads proposed in Alternative B would be located on slopes with indicators of active or latent instability. This Project Element would have a neutral effect on Suspended Sediment / Turbidity, Substrate, Peak / Base Flows, Disturbance History, Riparian Reserves, Large Woody Debris, and all other Indicators.

Landings. All proposed landings to be used for the project are existing and are outside of Riparian Reserves. Soil Quality Standards and BMPs for landings would be implemented to minimize erosion. Intact and functioning Riparian Reserves will protect intermittent or ephemeral stream channels from sediment delivery by intercepting sediment. The existing landings (which are existing

wide areas along roads or existing landings outside of any reserves) are distant and hydrologically disconnected from anadromous salmonid habitat and would have no effect on anadromous fish or their habitat. This Project Element would have a neutral effect on Suspended Sediment / Turbidity, Substrate, Peak / Base Flows, Disturbance History, Riparian Reserves, Large Woody Debris, and all other Indicators.

TABLE 7. Summary of the effects of the Eddy Gulch LSR Project on anadromous fish and their habitat for each habitat Indicator.

Indicator	Fuels Reduction - Mechanical Thin	Fuels Reduction-Burning, Mastication, Hand Treatments	Road-Related Actions	Water Drafting
Temperature	0	0	0	0
Suspended Sediment / Turbidity	0	-/+-	0	0
Chemical Contamination / Nutrients	0	0	0	0
Physical Barriers	0	0	0	0
Substrates / Embeddedness	0	-/+-	0	0
Large Woody Debris	0	0	0	0
Pool Frequency and Quality	0	0	0	0
Large Pools	0	0	0	0
Off-channel Habitat	0	0	0	0
Refugia	0	0	0	0
Average Wetted Width / Maximum Depth pools	0	0	0	0
Streambank Condition	0	0	0	0
Floodplain Connectivity	0	0	0	0
Peak / Base Flows	0	-/+	0	Short duration during water drafting, see NMFS (2001)
Drainage Network	0	0	0	0
Road Density / Location	0	0	0	0
Disturbance History	0	-/+	0	0
Riparian Reserves	0	0	0	0

Notes:

- \- insignificantly negative effect
- 0 neutral effect
- \+ long-term positive effect
- -/+ insignificantly negative effect and long-term positive effect

2.) Project Elements that fall under existing KNF ESA programmatic consultations for anadromous watersheds.

The following Eddy Gulch LSR Project Elements comply with previous ESA programmatic consultations:

1. Hazard Tree Removal
2. Haul Route Use and Maintenance
3. Road Closure

4. Fuels Reduction Actions

3.) Other Project Element: Water Drafting

Ten water drafting sites would be located in anadromous fish-bearing reaches as follows (refer to Figure C-2 in Appendix C): Crawford Creek (1), Mathews Creek (1), North Fork Salmon River (1), North Russian Creek (3), Shadow Creek (1), South Russian Creek (1), South Fork Salmon River (1), and Whites Gulch (1). Water drafting will be done in accordance with NMFS *Water Drafting Specifications* (USDC NMFS 2001), which limits the amount and rate at which water can be withdrawn during pumping and requires pumps to be screened. By following these specifications, potential direct and indirect effects of water drafting on salmonids and their habitat would be negligible. Due to adherence to NMFS (2001) guidelines and because existing sites will be used, it has been determined that this Project Element would have an insignificantly negative effect on Peak / Base Flows and streambank stability and no effect on Suspended Sediment / Turbidity, Substrate, Water Temperature, and other Indicators.

The following conclusions lead to my final determination of effects of the proposed project on Threatened coho salmon, critical habitat, Chinook salmon and its habitat, and steelhead and its habitat:

1. The effects of Project Elements on habitat Indicators would be neutral, insignificantly negative, or insignificantly negative with long-term positive effects. Any effect on habitat Indicators would not be to a level that the habitat Indicator function is changed.

2. Mechanical unit locations and design reflect input from the ID team, including hydrologist and fisheries biologist. Effects minimization measures were used to decrease potential effects of the Project to an insignificant level.

3. The resource protection measures (Appendix D) will be implemented to minimize effects of Project Elements on the landscape, Riparian Reserves, streams, and habitat Indicators. The project would help protect ecosystems from effects of future wildfire.

4. KNF Wet Weather Operation Standards (USDA Forest Service 2002a) will be used to minimize disturbance during wet weather.

5. The proposed treatment units were reviewed in the field by fisheries biologists and hydrologists to assess potential effects and existing conditions. It was determined that the project is not likely to adversely affect anadromous fish or their habitat. Previous programmatic consultations provided guidance and sideboards for minimizing adverse effects to the NLAA level for fuels reduction actions and hazard tree removal. These guidelines were incorporated into the project. The Analytical Process Indicator analysis outcome supports field observations that the probability for significant effects on anadromous fish or their habitat (including critical habitat and Essential Fish Habitat) is unlikely, and that potential effects would either be neutral, insignificantly negative, or insignificantly negative with long-term positive effects.

XI. ESA Effects Determination

In summary, all the actions, when considered collectively and individually, would have either no effect (as described in the efficiency measures section of this BA/BE) or are not likely to adversely affect coho salmon and their critical habitat. ESA consultation for the actions with the ESA determination of "May Affect, Not Likely to Adversely Affect" has been completed using the tiering and compliance forms consistent with, and associated with, the 2001 and 2004 programmatic consultation documents (see BA/BE Appendix H for the tiering forms). The project has indirect beneficial effects that would result in increased protection from wildfire. The one activity that was determined "May Affect, Not Likely to Adversely Affect" is water drafting. Thus, it is my determination that the Eddy Gulch LSR Project's insignificantly negative effects of water drafting on peak / base flows and coho salmon that may be in the vicinity of water drafting sites "May Affect, but is Not Likely to Adversely Affect" SONCC coho salmon.

Based on the analysis in this BA/BE, it is my determination that the Eddy Gulch LSR Project "May Affect, but is Not Likely to Adversely Affect" SONCC coho salmon critical habitat.

XII. Sensitive Species Effects Determination

The Eddy Gulch LSR Project would likely not result in a trend towards listing or loss of viability of steelhead or Chinook salmon and may have beneficial effects on watershed conditions that support these species.

XIII. Essential Fish Habitat Assessment

A fish distribution GIS map was provided by the KNF and was used to analyze effects on salmonid habitat and to identify critical habitat for SONCC coho salmon and Essential Fish Habitat for Chinook and coho salmon within the Eddy Gulch LSR (see Figure C-2 in Appendix C and the proximity Table 4 presented earlier in this document). The KNF fish distribution map includes all streams that are used by steelhead, coho salmon, and Chinook salmon. The KNF and this analysis used the fish distribution map to identify critical habitat for SONCC coho salmon and Chinook and coho salmon Essential Fish Habitat since it is the most complete and conservative information relative to estimating the extent of anadromous habitat. However, because coho salmon and Chinook salmon do not typically migrate or rear as high up in stream systems as steelhead, the fish distribution map used for this analysis overestimates the extent of SONCC coho salmon critical habitat and Chinook and coho salmon Essential Fish Habitat because it is based on steelhead and resident trout distribution. Thus, steelhead may occupy some reaches not accessible to coho and Chinook salmon. However, effects were considered for all anadromous species, and habitat for all anadromous species was assumed to occur where steelhead and rainbow trout occur. The effects analysis in this BA/BE considers effects on Pacific salmonid habitat in general, and since habitat requirements and effects mechanisms for coho and Chinook salmon are similar, the effects of the project analyzed previously are identical for Essential Fish Habitat. Therefore, it is my determination that the Eddy Gulch LSR Project will not adversely affect, and may have long-term positive effects on coho salmon and Chinook salmon Essential Fish Habitat. Beneficial effects would include increased watershed

resiliency to future wildfires and promotion of late-successional vegetation, which would increase large woody debris in forests and streams.

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APPENDIX A

Klamath National Forest Matrix: Table of Population and Habitat Indicators for Use on the Klamath National Forest in the Northwest Forest Plan Area

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Klamath National Forest Matrix: Table of Population and Habitat Indicators for Use on the Klamath National Forest in the Northwest Forest Plan Area

Aquatic Habitat Conditions Analysis Guidelines

The table below shows criteria used to determine baseline conditions in 7th-and 5th-field watersheds within the KNF boundaries. The existing conditions and effects on Indicators are discussed in the narrative within the BA/BE and are summarized in the table/checklist format. The table below represents the most recent Level 1 review as completed by J. Perrochet (KNF) and D. Flickinger (NMFS) in April 2007.

Klamath National Forest Tributaries Table of Pathways and Indicators:

Pathways	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Habitat: Non Watershed Condition Indicators				
Water Quality:	**Temperature (1)**			
	1st - 3rd Order Streams [instantaneous]	69°For less	> 69 to 70.5°F	> 70.5°F
	4th–5th Order Streams [7 Day Maximum]	70.5°F or less ~ 21.4°C	> 70.5 to 73.5°F	> 73.5°F; ~23°C
	Suspended Sediment/Turbidity (2)	Low	Medium	High
		Compliance with Clean Water Act requirements for suspended sediment and turbidity at the site and project scale is achieved through application of appropriate Best Management Practices and other measures as specified by permits from relevant State Water Quality Control Board.		
	Chemical/Nutrient Contamination (3)	Low levels of contamination from agriculture, industrial, and other sources; no excess nutrients. No CWA 303d designated reaches.	Moderate levels of contamination from agriculture, industrial, and other sources; some excess nutrients. One CWA 303d designated reach.	High levels of contamination from agriculture, industrial, and other sources; high levels of nutrients. More than one CWA 303d designated reach.
Habitat Access:	Physical Barriers (3)	Any man-made barriers present in watershed allow upstream and downstream passage at all flows.	One or more human -made barriers present in watershed do not allow upstream and/or downstream passage at base/low flows.	Human-made barriers present in watershed do not allow upstream and/or downstream passage at a range of flows for at least one life history stage.

Klamath National Forest Tributaries Table of Pathways and Indicators:				
Pathways	**Indicators**	**Properly Functioning**	**At Risk**	**Not Properly Functioning**
Habitat Elements:	Substrate character (4)	Use USLE and GEO model to determine functioning level and potential effects of sediment delivery to streams that may affect anadromous fish and their habitat. Existing condition for fines and embeddedness can also be used.		
		Less than 15% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and cobble embeddedness less than 20%.	15% or greater fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and/or cobble embeddedness is 20% or greater.	Greater than 20% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and cobble embeddedness greater than 25%.
	Large Woody Debris (3)	More than 20 pieces of large wood (>12 inches in diameter and >50 feet in length) per mile; also adequate source of woody debris are available for both long- and short-term recruitment.	Current levels are being maintained at minimum levels desired for "properly functioning" but potential sources for long term woody debris recruitment are lacking to maintain these minimum values.	Current levels are not at those desired levels for "properly functioning" and potential sources of woody debris for short and/or long term recruitment are lacking.
	Pool Quality (Pool = 1meter deep) and Frequency (4)	At least 1 pool every 3 to 7 bankfull channel widths. These pools should occupy at least 50% of the low-flow channel width and all have a maximum depth of at least 36 inches.	At least 1 pool every 3 to 7 bankfull channel widths. These pools should occupy at least 50% of the low-flow channel width. At least half of the pools have a maximum depth of at least 36 inches.	Less than 1 pool every 7 bankfull channel widths and/or less than half of the pools have a maximum depth of at least 36 inches.
	Off-channel Habitat (3)	Watershed has many ponds, oxbows, backwaters and other off channel areas with cover; and side channels are low energy areas.	Watershed has some ponds, oxbows, backwaters and other off channel areas with cover; but side channels are generally high energy areas.	Watershed has few or no ponds, oxbows, backwaters or other off-channel areas.
	Refugia (important remnant habitat for sensitive aquatic species) (3)	Habitat capable of supporting strong and significant populations are protected (e.g., by intact riparian reserves or conservation areas, ground water upwelling areas and seeps); and are well distributed and connected for all life stages and forms of the species.	Habitat capable of supporting strong and significant populations are insufficient in size, number, and connectivity to maintain all life stages and forms of the species	Adequate habitat refugia do not exist.
Channel Condition and Dynamics:	Width/Depth Ratio (5)	Width-to-Depth ratio <12 on all reaches that could otherwise best be described as 'A', 'G', and 'E' channel types. Width-to-Depth ratio >12 on all reaches that could otherwise best be described as 'B', 'F', and 'C' channel types. No braided streams formed due to excessive sediment loads	More than 10% of the reaches are outside of the ranges given for Width/Depth ratios for the channel types specified in "Properly Functioning" block. Braiding has occurred in some alluvial reaches as a result of excessive aggradation due to high sediment loads.	M ore than 25% of the reaches are outside of the ranges given for Width/Depth ratios for the channel types specified in "Properly Functioning" block. Braiding has occurred in many alluvial reaches as a result of excessive aggradation due to high sediment loads
	Streambank Condition (3)	>80% of any stream reach has ≥90% stability	50–80% of any stream reach has ≥90% stability	<50% of any stream reach has ≥90% stability

Klamath National Forest Tributaries Table of Pathways and Indicators:				
Pathways	**Indicators**	**Properly Functioning**	**At Risk**	**Not Properly Functioning**
Flow / Hydrology:	Floodplain Connectivity (3)	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession.	Reduced linkage of wetland, floodplains, and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession.	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland area drastically reduced and riparian vegetation/succession altered significantly.
	Increase in Drainage Network (3)	Zero or minimum increases in active channel length correlated with human caused disturbance (e.g., trails, ditches, compaction, impervious surface, etc).	Low to Moderate increases in active channel length correlated with human caused disturbance (e.g., trails ditches, compaction, impervious surface, etc).	Greater than moderate increase in active channel length correlated with human caused disturbance (e.g., trails ditches, compaction, impervious surface, etc).
Watershed Condition <u>Indicators</u>				
Watershed Conditions:	Road Density and Location (3)	Less than 2 miles per square mile.	Two to three miles per square mile.	Over 3 miles per square mile.
	Disturbance History (7)	CWE model indicator values (USLE, Mass-Wasting, and ERA) are not above 1.0. Clarify and verify conditions and risk through field reviews and/or other available info, as available.	One or two of the CWE model indicator values are above threshold of 1.0. Clarify and verify conditions and risk through field reviews and/or other available info, as available.	Three of the CWE model indicator values are above threshold of 1.0. Clarify and verify conditions and risk through field reviews and/or other available info, as available.
	Riparian Reserves – NW Forest Plan (3)	The riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (> 80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition > 50%.	Moderate loss of connectivity or function (shade, LWD recruitment, etc) of riparian reserve system, or incomplete protection of habitat and refugia for sensitive aquatic species (approx. 70–80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition 25–50% or better.	Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitat and refugia for sensitive aquatic species (approx. less than 70% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition is 25% or less.
	Disturbance Regime (7)	Environmental Disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable. This is best quantified through the CWE modeling described for Disturbance History.	Scour events, debris torrents or catastrophic fire are localized events that occur in several minor parts of the watershed. Resiliency of habitat to recover from environmental disturbances is moderate. This is best quantified through the CWE modeling described for Disturbance History	Frequent flood or drought producing highly variable and unpredictable flows, scour events, or high probability of catastrophic fire exists throughout a major part of the watershed. The channel is simplified, providing little hydraulic complexity in the form of pools or side channels. Natural processes are unstable. This is best quantified through the CWE modeling described for Disturbance History

Klamath National Forest Tributaries Table of Pathways and Indicators:				
Pathways	**Indicators**	**Properly Functioning**	**At Risk**	**Not Properly Functioning**
Summary Integration of all species and habitat indicators	How do the effects to indicators affect each fish species and their habitat? Describe by species and by 7th and 5th field watersheds. See AP guidance. In addition to the narrative summary, use Summary Table.			

Footnotes to Table Above: *Table of Population and Habitat Indicators For Use on the Klamath National Forest in the Northwest Forest Plan Area, as adjusted from Appendix A in the Analytical Process*.

The table, as designed in the 2004 Analytical Process, and in earlier versions (1997 NMFS BO for the LRMP), suggests values to determine a level of functioning for anadromous fish bearing streams. A note about rigid values to assess level of functioning: In addition to fixed habitat parameters not allowing for natural variability, they set standards that may be geomorphically inappropriate (Bisson et al. 1997). Variability is an inherent property of aquatic ecosystems in the Pacific Northwest and habitats at any given location will change from year to year, decade to decade, and century to century (Bisson et al. 1997). Healthy lotic ecosystems require different parts of the channel system to exhibit very different in-channel conditions and that those conditions change through time (Reid and Furniss 1998). Therefore, a conclusion of function must be evaluated with professional judgment recognizing the streams capability to perform within rigid values. In some cases, a stream's morphology, aspect or size may not support "Properly Functioning" criteria values for one or more habitat Indicators. If an Indicator for a particular stream is determined to be functioning at its capability (due to morphology, aspect, or size), it is rated as Properly Functioning even if it doesn't meet Appendix A table criteria values. The table serves to identify values to determine the quality of baseline conditions; the Checklists (Appendix B) serve to summarize the baseline conditions and effects by watershed.

(1) Proper Functioning criteria for 4th–5th Order streams is derived from temperature monitoring near the mouth of streams considered to be pristine or nearly pristine (Clear, Dillon, and Wooley Creeks – seven-day maximum temperatures as high as 70.5°F have been recorded on these streams [EA Engineering, 1998 Salmon River and Dillon Creek Watershed Fish Habitat and Channel Type Analysis, Appendix 2]). At-Risk criteria for 4th–5th order streams is derived from monitoring in streams that support populations of anadromous fish, although temperatures in this range (70.5°F to 73.5°F) are considered sub-optimal. A Not Properly Functioning criterion is sustained temperatures above 73.5°F that cause cessation of growth and approach lethal temperatures for salmon and steelhead. Properly Functioning criteria for 1st–3rd order streams is derived from Desired Future Conditions values given in the environmental impact statement for the KNF LRMP, page 3-68. At Risk and Not Properly Functioning are assigned on a temperature continuum with values given for 4th–5th order streams, with the maximum instantaneous temperature of At Risk of 1st–3rd order streams coinciding with the minimum 7-day maximum of 4th–5th order At Risk streams. Stream Order according to Strahler (1957).

(2) **Turbidity**: NTU data for streams in the Klamath River system on the Klamath National Forest are not available. Professional judgment on how fast a stream clears after a peak flow, stream surveys data for substrate conditions, and/or the CWE modeling are used to estimate the existing condition and post-action condition for this Indicator. The Analytical Process Table suggests using fine sediment as a surrogate. The risk of sediment delivery to streams is evaluated through the CWE modeling as described below in (4). Also, compliance with *Clean Water Act* requirements for suspended sediment and turbidity at the site and project scale is achieved through application of appropriate Best Management Practices and other measures as specified by permits from relevant State Water Quality Control Board.

1. *Properly Functioning*: Water clarity returns quickly (within several days) following peak flows ("Low").

2. *At Risk*: Water clarity slow to return following peak flows ("Medium").

3. *Not Properly Functioning*: Water clarity poor for long periods of time following peak flows. Some suspended sediments occur even at low flows or base flow ("High").

(3) Criteria unchanged from Analytical Process Table. Include consideration of whether the project is in a Key Watershed, as Key Watershed were develop to serve as 'anchors' for aquatic dependent species.

(4) Properly Functioning criteria for percent fines in gravel is taken from environmental impact statement for the KNF LRMP (page 3-68) can also be used to assess existing conditions when that information is available. When that information is unavailable, professional judgment is used to describe existing conditions and to estimate effects based upon model output interpretation, research results, or other information. The KNF CWE modeling procedure (Appendix G) describes the risk (probability) of Project-caused sediment production. For Existing and Post Action:

1. *Properly Functioning*: USLE and GEO values are less than 1.0.

2. *At Risk*: USLE and GEO values are between 1.0–1.20.

3. *Not Properly Functioning*: USLE and GEO values are greater than 1.20.

(5) The Width-to-Depth ratio for various channel types is based on delineative criteria of Rosgen (1996). Properly Functioning means that Width-to-Depth ratio falls within expected channel type as determined by the other four delineative factors (entrenchment, sinuosity, slope, and substrate). Aggradation on alluvial flats causing braiding is well known phenomenon that often accompanies changes in Width-to-Depth ratio as watershed condition deteriorates. Stream width is a function of streamflow occurrence and magnitude, size and type of transported sediment, and the bed and bank materials of the channel (Rosgen 1996). Channel widths generally increase downstream as the square root of discharge. Channel widths can be modified by changes in riparian vegetation, changes in streamflow regimes, and changes in sediment supply. Mean depth of channels varies greatly by reach under different discharges due to the sequence of riffle and pool bed features. Width-to-Depth ratios vary with the dimensions of the channel cross section for a given slope, boundary roughness as a function of streamflow and sediment regime, bank erodibility, degree of entrenchment and the distribution of energy in the stream channel (Rosgen 1996). The table in indicates that confined or entrenched channel types (such as A, G, and E types) are Properly Functioning when Width-to-Depth ratios are less than 12, and wider channel types (such as B, C, and F types) are Properly Functioning when Width-to-Depth ratios are greater than 12. To meet the Properly Functioning criteria channels must also have no or minimal braiding due to excessive sediment.

(6) **The table values in the 2004 Analytical Process suggest using hydrograph information to estimate existing flow conditions and post-project changes in flow. Hydrograph information is not available for most watersheds on the Forest. Forest Service Region 5 uses ERA/TOC to determine the existing risk as well as the risk of adverse effects to flows (Appendix G).**

(7) The three components of the KNF CWE model are used to determine conditions and risk to this Indicator (Appendix G). The KNF CWE model components replace the use of ECA because ECA is not used in Forest Service Region 5. Agreed to by Yip and Perrochet (Level 1) April 8, 2003.

1. *Properly Functioning*: All three model values (USLE, GEO and ERA) are less than 1.0 risk ratio; that is, below threshold.
2. *At Risk*: One or two model values is 1.0 or greater; that is, at or exceeding threshold.
3. *Not Properly Functioning*: Values for all three models is greater than 1.0.

APPENDIX B

Tables/Checklists for Documenting the Environmental Baseline and Effects of Project(s) on Relevant Indicators for the Project

Appendix B
Tables/Checklists for Documenting the Environmental Baseline and Effects of Project(s) on Relevant Indicators for the Project

Tables of Population and Habitat Indicators
Project: Eddy Gulch LSR Fuels / Habitat Protection Project

7th-field Watershed: Black Bear Creek

		Environmental Baseline			Effects of the Action		
DIAGNOSTIC OR PATHWAY	**INDICATORS**	**PROP. FUNCT.**	**FUNCT. AT RISK**	**NOT PROP. FUNCT.**	**PROP. FUNCT.**	**FUNCT. AT RISK**	**NOT PROP. FUNCT.**
HABITAT:							
Water Quality:	Temperature	Data on Kris Web and KNF temp data				X	
	Suspended Sediment - Intergravel DO/Turbidity	SSRS 2002; PJ				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	SRRS 2002				X	
Habitat Elements:	Substrate Character and /Embeddedness	DB CWE				X	
	Large Woody Debris		DB and PJ			X	
	Pool Frequency and Quality		DB and PJ			X	
	Large Pools		PJ			X	
	Off-channel Habitat		N/A			X	
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**		SSRS 2002; PJ			X	
	Streambank Condition		SSRS 2002			X	
	Floodplain Connectivity		N/A			X	
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network		SSRS 2002			X	

7th-field Watershed: Black Bear Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
WatershedConditions:	**Road Density & Location**		Road density 2.67 mi/sq. mi			X	
	Disturbance History		SSRS 2002; CWE			X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002; DB				X	
	Disturbance Regime		PJ and CWE			X	
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		The availability of suitable spawning habitats is limited and high gradient channel type will continue to limit production in this watershed. However, the watershed provides high quality water, cool temperatures and large wood to downstream habitat utilized by salmonids.				

DB: information based on USFS habitat typing, SCI and thermographs surveys as compiled in runstreams database (USFS 2003).

SSRS 2002: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

PJ: Professional Judgment.

N/A: Not Applicable.

CWE: Yoakumville Roads CWE Analysis Specialist Report (Elder 2003).

7th-field Watershed: Cody-Jennings

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SSRS 2002				X	
	Suspended Sediment - Intergravel DO/Turbidity	SSRS 2002				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	SRRS 2002				X	
Habitat Elements:	Substrate Character and Embeddedness		DB; CWE			X	
	Large Woody Debris	DB and PJ				X	
	Pool Frequency and Quality	DB and PJ				X	
	Large Pools		PJ			X	
	Off-channel Habitat		N/A			X	
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth Ratio in scour pools in a reach**	SSRS 2002; PJ				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A			X	
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network		SSRS 2002			X	
WatershedConditions:	**Road Density & Location**	Road density 1.41 mi/sq. mi				X	
	Disturbance History		SSRS 2002; CWE			X	
	Riparian Reserves - Northwest Forest Plan	DB	DB			X	
	Disturbance Regime		PJ and CWE			X	

7th-field Watershed: Cody-Jennings

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to downstream habitat utilized by salmonids. Habitat limitations are mostly due to channel type/capability, not to impacts.				

DB: Information based on USFS habitat typing, SCI and thermograph surveys as compiled in runstreams database (USFS 2003).

SSRS 2002: Salmon River Sub-basin Restoration Strategy (USDA FS 2002).

PJ: Professional Judgment.

N/A: Not Applicable.

CWE: Meteor CWE Analysis Specialist Report (Elder 2003).

7th-field Watershed: Crawford Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002; 1994 WA				X	
	Suspended Sediment - Intergravel DO/Turbidity	SSRS 2002 and PJ				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1994 WA				X	
Habitat Elements:	Substrate Character and /Embeddedness	SSRS 2002; 1994 WA				X	
	Large Woody Debris		SRSS 2002; PJ			X	
	Pool Frequency and Quality		SRSS 2002; 1994 WA			X	
	Large Pools		PJ			X	
	Off-channel Habitat		N/A			X	
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network		SSRS 2002			X	
WatershedConditions:	**Road Density & Location**		Road density 3.09 mi/sq mi			X	
	Disturbance History		SSRS 2002			X	
	Riparian Reserves - Northwest Forest Plan		SSRS 2002			X	
	Disturbance Regime		SRSS 2002			X	

7th-field Watershed: Crawford Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to downstream habitat utilized by salmonids. This watershed was not ranked as important for spawning or rearing. Limitations due to channel type/capability, not to impacts.				

1994 WA: Watershed Analysis 1994.

PJ: Professional Judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

7th-field Watershed: Eddy Gulch

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	Temp Data				X	
	Suspended Sediment - Intergravel DO/Turbidity		CWE (roads)			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	Habitat surveys				X	
Habitat Elements:	Substrate Character and /Embeddedness		CWE; habitat surveys 1993			X	
	Large Woody Debris		Habitat surveys 1993; PJ			X	
	Pool Frequency and Quality		Habitat surveys 1993			X	
	Large Pools		PJ			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002; Temp data				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002; habitat surveys 1993				X	
	Streambank Condition	SSRS 2002; habitat surveys 1993				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002; CWE				X	
	Increase in Drainage Network		SSRS 2002; CWE			X	
WatershedConditions:	**Road Density & Location**			Road density 4.46 mi/sq. mi		X	
	Disturbance History		SSRS 2002; CWE			X	

7th-field Watershed: Eddy Gulch

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
	Riparian Reserves - Northwest Forest Plan		SSRS 2002; CWE			X	
	Disturbance Regime		SRSS 2002; CWE			X	
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to downstream habitat utilized by salmonids. Habitat limitations are mostly due to steep gradient, channel type. This stream is not key for spawning, holding or rearing for Chinook and coho and provides limited steelhead habitat.				

HT 93: Habitat typing data from 1993 on Eddy Gl.

PJ: Professional judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

CWE 03: Meteor CWE, Elder, D., USFS.

Temp data: temperature data collected in Eddy Gl.

7th-field Watershed: Gooey-Ketchum

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002				X	
	Suspended Sediment - Intergravel DO/Turbidity	SRSS 2002				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1994 WA				X	
Habitat Elements:	Substrate Character and /Embeddedness	SRSS 2002				X	
	Large Woody Debris		SRSS 2002			X	
	Pool Frequency and Quality	SRSS 2002				X	
	Large Pools		SSRS; PJ			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SSRS 2000				X	
WatershedConditions:	**Road Density & Location**	Road density 1.92 mi/sq. mi				X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	
	Disturbance Regime	SRSS 2002				X	

7th-field Watershed: Gooey-Ketchum

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to downstream habitat utilized by salmonids.				

1994 WA: Watershed Analysis completed in 1994.
PJ: Professional Judgment.
SSRS 2002: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).
SU 1987: Habitat typing data.
N/A: Not Applicable.
SU 1993: LWD inventory.
CWE: Meteor CWE analysis, Elder, D., 2003, USFS.

7th-field Watershed: Indian Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	DB				X	
	Suspended Sediment - Intergravel DO/Turbidity		SRSS 2002; CWE			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	SRSS 2002				X	
Habitat Elements:	Substrate Character and /Embeddedness		DB; CWE			X	
	Large Woody Debris		DB			X	
	Pool Frequency and Quality		DB			X	
	Large Pools		DB			X	
	Off-channel Habitat		N/A				
	Refugia		SSRS 2002			X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**			SSRS 2002; CWE		X	
	Streambank Condition			SSRS 2002; CWE		X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**			SSRS 2002; CWE		X	
	Increase in Drainage Network		SSRS 2002			X	
WatershedConditions:	**Road Density & Location**			Road density 3.21 mi/sq. mi		X	
	Disturbance History			SSRS 2002; CWE		X	
	Riparian Reserves - Northwest Forest Plan			SSRS 2002; DB		X	
	Disturbance Regime			SRSS 2002		X	

7th-field Watershed: Indian Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		High gradient channel type limits salmonid production. This watershed provides high quality water, cool temperatures and large wood to downstream habitat utilized by salmonids.				

DB: Information based on USFS habitat typing, SCI, and thermograph/hobotemp surveys. Survey data is housed in runstreams database (USFS 2003).

SSRS 2000: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

PJ: Professional Judgment.

N/A: Not Applicable.

CWE: Yoakumville Roads.

Cumulative Watershed Effects (CWE) Analysis Specialist Report, Don Elder, USFS, 2003.

7th-field Watershed: Lower North Russian

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002				X	
	Suspended Sediment - Intergravel DO/Turbidity		SRSS 2002			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1995 WA				X	
Habitat Elements:	Substrate Character and /Embeddedness		SRSS 2002			X	
	Large Woody Debris	SRSS 2002				X	
	Pool Frequency and Quality	SRSS 2002				X	
	Large Pools	SSRS 2002				X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SSRS 2002				X	
WatershedConditions:	**Road Density & Location**	Road density 1.69 mi/sq. mi				X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan		SSRS 2002			X	
	Disturbance Regime	SSRS 2002				X	

7th-field Watershed: Lower North Russian

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by steelhead. North Russian is one of the most heavily used streams by steelhead for spawning.				

Temp data: Temperature data collected.

PJ: Professional judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

1995 WA: North Fork Watershed Analysis.

7th-field Watershed: South Russian Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	Habitat typing 1994				X	
	Suspended Sediment - Intergravel DO/Turbidity	Habitat typing 1994				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	Habitat typing 1994				X	
Habitat Elements:	Substrate Character and /Embeddedness		Habitat typing 1994			X	
	Large Woody Debris	Habitat typing 1994				X	
	Pool Frequency and Quality	Habitat typing 1994				X	
	Large Pools	Habitat typing 1994				X	
	Off-channel Habitat		N/A				
	Refugia	Habitat typing 1994				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	Habitat typing 1994				X	
	Streambank Condition	Habitat typing 1994				X	
	Floodplain Connectivity	Habitat typing 1994					
Flow/Hydrology:	**Change in Peak/Base Flows**	PJ				X	
	Increase in Drainage Network	NF ATM				X	

7th-field Watershed: South Russian Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
WatershedConditions:	**Road Density & Location**			Road density 3.63 mi/sq. mi		X	
	Disturbance History	WEST CWE				X	
	Riparian Reserves - Northwest Forest Plan	Habitat typing 1994				X	
	Disturbance Regime	WEST CWE				X	
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by steelhead.				

1994 SU: Habitat typing data from 1994 on South Russian Creek.

PJ: Professional judgment.

West CWE: Klamath National Forest westside CWE analysis.

NF ATM: North Fork Salmon River Access and Travel Management Analysis.

7th-field Watershed: Mathews Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002; 2003 survey				X	
	Suspended Sediment - Intergravel DO/Turbidity		SRSS 2002; CWE			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	DB				X	
Habitat Elements:	Substrate Character and /Embeddedness		DB; CWE			X	
	Large Woody Debris		DB			X	
	Pool Frequency and Quality		DB			X	
	Large Pools		DB			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002; 2003 survey				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002; CWE				X	
	Increase in Drainage Network		SSRS 2002			X	
WatershedConditions:	**Road Density & Location**		Road density 2.71 mi/sq. mi			X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan		SSRS 2002			X	
	Disturbance Regime	SSRS 2002				X	

7th-field Watershed: Mathews Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. Mathews Creek is not key to spawning or rearing for steelhead, Chinook or coho salmon.				

1997 WA: Lower South Fork of the Salmon River Ecosystem Analysis.
PJ: Professional judgment.
SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).
N/A: Not Applicable.

7th-field Watershed: Shadow Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002				X	
	Suspended Sediment - Intergravel DO/Turbidity	SRSS 2002				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1991 survey				X	
Habitat Elements:	Substrate Character and /Embeddedness	SRSS 2002				X	
	Large Woody Debris	1991 Survey				X	
	Pool Frequency and Quality	1991 Survey				X	
	Large Pools	1991 Survey				X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network		SSRS 2002			X	
WatershedConditions:	**Road Density & Location**		Road density 2.73 mi/sq. mi			X	
	Disturbance History		SSRS 2002			X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	
	Disturbance Regime		SSRS 2002			X	

7th-field Watershed: Shadow Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. Shadow Creek has limited spawning habitat for steelhead and not suitable for Chinook or coho salmon.				

PJ: Professional judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

7th-field Watershed: Sixmile

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002				X	
	Suspended Sediment - Intergravel DO/Turbidity	SRSS 2002				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1994 WA				X	
Habitat Elements:	Substrate Character and /Embeddedness	SRSS 2002				X	
	Large Woody Debris	SRSS 2002				X	
	Pool Frequency and Quality	SRSS 2002				X	
	Large Pools	SRSS 2002				X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SSRS 2002				X	
WatershedConditions:	**Road Density & Location**	Road density 1.66 mi/sq mi				X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	
	Disturbance Regime	SSRS 2002				X	

7th-field Watershed: Sixmile

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. Resident trout utilize this stream.				

SSRS 2002: Salmon River Sub-basin Restoration Strategy (USDA FS 2002).

PJ: Professional Judgment.

1994 WA: Watershed Analysis 1994.

Field surveys conducted in 1999.

CWE: Meteor CWE Analysis specialist report (Elder 2003).

N/A: Not Applicable.

7th-field Watershed: Tanner-Jessups

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	Tribs.	DB			X	
	Suspended Sediment - Intergravel DO/Turbidity	SRSS 2002				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	Surveys				X	
Habitat Elements:	Substrate Character and /Embeddedness		Surveys 1991, 2003			X	
	Large Woody Debris			Surveys 1991, 2003		X	
	Pool Frequency and Quality		Surveys 1991, 2003			X	
	Large Pools		Surveys 1991, 2003			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002; Surveys 1991, 2003				X	
	Streambank Condition	SSRS 2002; Surveys 1991, 2003				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002; CWE				X	
	Increase in Drainage Network		SSRS 2002; CWE			X	
WatershedConditions:	**Road Density & Location**		Road density 3.16 mi/sq. mi			X	
	Disturbance History	SSRS 2002; CWE				X	

7th-field Watershed: Tanner-Jessups

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
	Riparian Reserves - Northwest Forest Plan	Tribs Survey 2003	SSRS 2002; Surveys 1991, 2003			X	
	Disturbance Regime	SSRS 2002; CWE				X	
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. This stream is not key spawning or rearing habitat for anadromous salmonids.				

SSRS 2002: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

PJ: Professional judgment.

N/A: Not Applicable.

SU 1991, 2003: Field surveys, 1991, 2003.

CWE: Meteor CWE Analysis specialist report, Elder, D., 2003, USFS.

DB: Information based on USFS habitat typing, SCI, and thermograph/hobotemp surveys. Survey data is housed in runstreams database (USFS 2003).

7th-field Watershed: Taylor Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	1994 survey data				X	
	Suspended Sediment - Intergravel DO/Turbidity		SRSS 2002			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1994 survey data				X	
Habitat Elements:	Substrate Character and /Embeddedness		1994 survey data; SRSS 2002			X	
	Large Woody Debris	1994 survey data				X	
	Pool Frequency and Quality		SRSS 2002; 1994 survey			X	
	Large Pools		SRSS 2002; 1994 survey			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002; Surveys 1994 survey				X	
	Streambank Condition	SSRS 2002; 1994 survey				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SSRS 2002				X	
WatershedConditions:	**Road Density & Location**	Road density 1.74 mi/sq. mi				X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	

7th-field Watershed: Taylor Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
	Disturbance Regime	SSRS 2002; CWE				X	
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. This stream is not key spawning or rearing habitat for anadromous salmonids.				

1994 SD: Raw data from 1994 survey.
PJ: Professional judgment.
SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).
N/A: Not Applicable

7th-field Watershed: Timber-French

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature		1994 WA			X	
	Suspended Sediment - Intergravel DO/Turbidity	1994 WA				X	
	Chemical Contamination/ Nutrients	1994 WA; PJ				X	
Habitat Access:	Physical Barriers	1999 survey data				X	
Habitat Elements:	Substrate Character and /Embeddedness		1994 WA			X	
	Large Woody Debris		SRSS 2002			X	
	Pool Frequency and Quality	PJ; 199 survey				X	
	Large Pools		1999 survey			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002; CWE				X	
	Increase in Drainage Network		SSRS 2002; CWE			X	
WatershedConditions:	**Road Density & Location**	Road density 1.58 mi/sq. mi				X	
	Disturbance History	SSRS 2002; CWE				X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002; 1994 WA				X	
	Disturbance Regime	SSRS 2002; 1994 WA; CWE				X	

7th-field Watershed: Timber-French

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. This stream is not key spawning or rearing habitat for anadromous salmonids.				

SSRS 2002: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

PJ: Professional Judgment.

1994 WA: Watershed Analysis 1994.

Field surveys conducted in 1999.

CWE: Meteor CWE Analysis specialist report (Elder 2003).

N/A: Not Applicable.

7th-field Watershed: Upper North Russian Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	SRSS 2002				X	
	Suspended Sediment - Intergravel DO/Turbidity		SRSS 2002			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1994 WA				X	
Habitat Elements:	Substrate Character and /Embeddedness		SRSS 2002			X	
	Large Woody Debris		SRSS 2002			X	
	Pool Frequency and Quality	SRSS 2002				X	
	Large Pools	SRSS 2002				X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SRSS 2002				X	
WatershedConditions:	**Road Density & Location**		Road density 2.56 mi/sq. mi			X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan		SSRS 2002			X	
	Disturbance Regime	SSRS 2002; 1995 WA				X	

7th-field Watershed: Upper North Russian Creek

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. North Russian Creek is heavily utilized by steelhead for spawning.				

Temp data: Temperature data collected.

PJ: Professional judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

1995 WA: North Fork Watershed Analysis.

1994 SU: Habitat typing data from 1994 on South Russian Creek.

PJ: Professional judgment.

West CWE: Klamath National Forest Westside CWE Analysis.

NF ATM: North Fork Salmon River Access and Travel Management Analysis.

N/A: Not Applicable.

7th-field Watershed: Whites Gulch

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	Temp data				X	
	Suspended Sediment - Intergravel DO/Turbidity		SRSS 2002; 1995 WA			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers			SRSS 2002		X	
Habitat Elements:	Substrate Character and /Embeddedness		SRSS 2002; 1995 WA			X	
	Large Woody Debris		SRSS 2002; 1995 WA			X	
	Pool Frequency and Quality		SRSS 2002; 1995 WA			X	
	Large Pools		SRSS 2002; 1995 WA			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**		SSRS 2002			X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SRSS 2002				X	
WatershedConditions:	**Road Density & Location**		Road density 2.22 mi/sq. mi			X	
	Disturbance History		SSRS 2002			X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	
	Disturbance Regime		SSRS 2002; 1995 WA			X	

7th-field Watershed: Whites Gulch

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream. North Russian Creek is heavily utilized by steelhead for spawning.				

Temp data: temperature monitoring data.

PJ: Professional judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

1995 WA: North Fork Watershed Analysis.

7th-field Watershed: Kanaka-Olsen

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature		Temp data			X	
	Suspended Sediment - Intergravel DO/Turbidity	SRSS 2002; Olson/Dix				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1989 survey				X	
Habitat Elements:	Substrate Character and /Embeddedness	SRSS 2002; Olson/Dix				X	
	Large Woody Debris		SRSS 2002; Olson/Dix			X	
	Pool Frequency and Quality		SRSS 2002; Olson/Dix			X	
	Large Pools		SRSS 2002; Olson/Dix			X	
	Off-channel Habitat		N/A				
	Refugia	SRSS 2002; Olson/Dix				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SRSS 2002; Olson/Dix				X	
	Streambank Condition	SRSS 2002; Olson/Dix				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SRSS 2002; Olson/Dix				X	
	Increase in Drainage Network	SRSS 2002				X	
WatershedConditions:	**Road Density & Location**		Road density 2.11 mi/sq. mi			X	
	Disturbance History		SSRS 2002			X	
	Riparian Reserves - Northwest Forest Plan		SSRS 2002			X	
	Disturbance Regime		SSRS 2002			X	

7th-field Watershed: Kanaka-Olsen

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream.				

Olson/Dix: Lower Salmon River Sub-basin Fish Habitat Condition and Utilization Assessment 1990/1991, 3/93.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

PJ: Personal Judgment.

Temp Data: Temperature monitoring data for North Fork Salmon River.

1989 SU: Habitat surveys completed in 1989.

N/A: Not Applicable.

7th-field Watershed: Robinson/Rattlesnake

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	Temp data				X	
	Suspended Sediment - Intergravel DO/Turbidity	SRSS 2002; 1990 survey				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1990 survey				X	
Habitat Elements:	Substrate Character and /Embeddedness	SRSS 2002; 1990 survey				X	
	Large Woody Debris		SRSS 2002; 1995 WA			X	
	Pool Frequency and Quality		SRSS 2002; 1995 WA			X	
	Large Pools	SRSS 2002; 1995 WA				X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity		N/A				
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SRSS 2002				X	
WatershedConditions:	**Road Density & Location**	Road density 1.63 mi/sq. mi				X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	
	Disturbance Regime	SSRS 2002; 1995 WA				X	

7th-field Watershed: Robinson/Rattlesnake

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, cool temperatures and large wood to habitat utilized by salmonids downstream.				

Temp data: temperature monitoring data.

PJ: Professional judgment.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

1995 WA: North Fork Watershed Analysis.

1990 SU: Survey data from 1990.

5th-field Watershed: North Fork Salmon River

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature	Temp data				X	
	Suspended Sediment - Intergravel DO/Turbidity	Wilderness areas	SRSS 2002; CWE 2003			X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1990 survey				X	
Habitat Elements:	Substrate Character and /Embeddedness	Wilderness	SRSS 2002;			X	
	Large Woody Debris	Wilderness	SRSS 2002; North Fork WA			X	
	Pool Frequency and Quality		SRSS 2002; 1990 survey			X	
	Large Pools	SRSS 2002; 1990 survey				X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002; 1990 survey				X	
	Streambank Condition	SSRS 2002; 1990 survey				X	
	Floodplain Connectivity	SSRS 2002; 1990 survey				X	
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002; CWE 2003				X	
	Increase in Drainage Network	CWE 2003				X	
WatershedConditions:	**Road Density & Location**	CWE 2003				X	
	Disturbance History	CWE 2003				X	
	Riparian Reserves - Northwest Forest Plan	Wilderness	North Fork WA			X	
	Disturbance Regime	CWE 2003				X	

5th-field Watershed: North Fork Salmon River

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, and some of the last remaining high quality habitat in the Klamath Basin. The general trend for Chinook salmon has been an increase (SRSS 2002). Coho salmon and steelhead numbers are unknown.				

Olson/Dix: Lower Salmon River Sub-basin Fish Habitat Condition and Utilization Assessment 1990/1991, 3/93.

SSRS: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

PJ: Personal Judgment.

Temp Data: Temperature monitoring data for North Fork Salmon River.

1990 Survey: Habitat surveys completed in 1989.

N/A: Not Applicable.

5th-field Watershed: South Fork Salmon River

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
HABITAT:							
Water Quality:	Temperature		1994 WA			X	
	Suspended Sediment - Intergravel DO/Turbidity	1994 WA				X	
	Chemical Contamination/ Nutrients	PJ				X	
Habitat Access:	Physical Barriers	1999 survey				X	
Habitat Elements:	Substrate Character and /Embeddedness	1994 WA				X	
	Large Woody Debris		SRSS 2002			X	
	Pool Frequency and Quality		1999 survey			X	
	Large Pools		1999 survey			X	
	Off-channel Habitat		N/A				
	Refugia	SSRS 2002				X	
Channel Condition & Dynamics:	**Average Wetted Width/ Maximum Depth** **Ratio in scour pools in a reach**	SSRS 2002				X	
	Streambank Condition	SSRS 2002				X	
	Floodplain Connectivity	SSRS 2002				X	
Flow/Hydrology:	**Change in Peak/Base Flows**	SSRS 2002				X	
	Increase in Drainage Network	SSRS 2002; Summerville Roads Project info.				X	
WatershedConditions:	**Road Density & Location**	SSRS 2002; Summerville Roads Project info.				X	
	Disturbance History	SSRS 2002				X	
	Riparian Reserves - Northwest Forest Plan	SSRS 2002				X	
	Disturbance Regime	SSRS 2002				X	

5th-field Watershed: South Fork Salmon River

DIAGNOSTIC OR PATHWAY	INDICATORS	Environmental Baseline			Effects of the Action		
		PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.	PROP. FUNCT.	FUNCT. AT RISK	NOT PROP. FUNCT.
SPECIES AND HABITAT:							
Species and Habitat:	**Summary/Integration of all Species and Habitat Indicators**		This watershed provides high quality water, and some of the last remaining high quality habitat in the Klamath Basin. The general trend for Chinook salmon has been an increase (SRSS 2002). Coho salmon and steelhead numbers are unknown.				

SSRS 2002: Salmon River Subbasin Restoration Strategy (USDA FS 2002b).

N/A: Not Applicable.

WA: Watershed Analysis 1994.

PJ: Professional Judgment.

Field Surveys 1999.Summerville 2 Roads Project.

APPENDIX C

Project Maps, Drafting Sites, and Salmonid Habitat Distribution Map for the Eddy Gulch LSR Project Assessment Area

FIGURE C-1a. Locations of Proposed Actions for the Eddy Gulch LSR Project, Klamath National Forest.

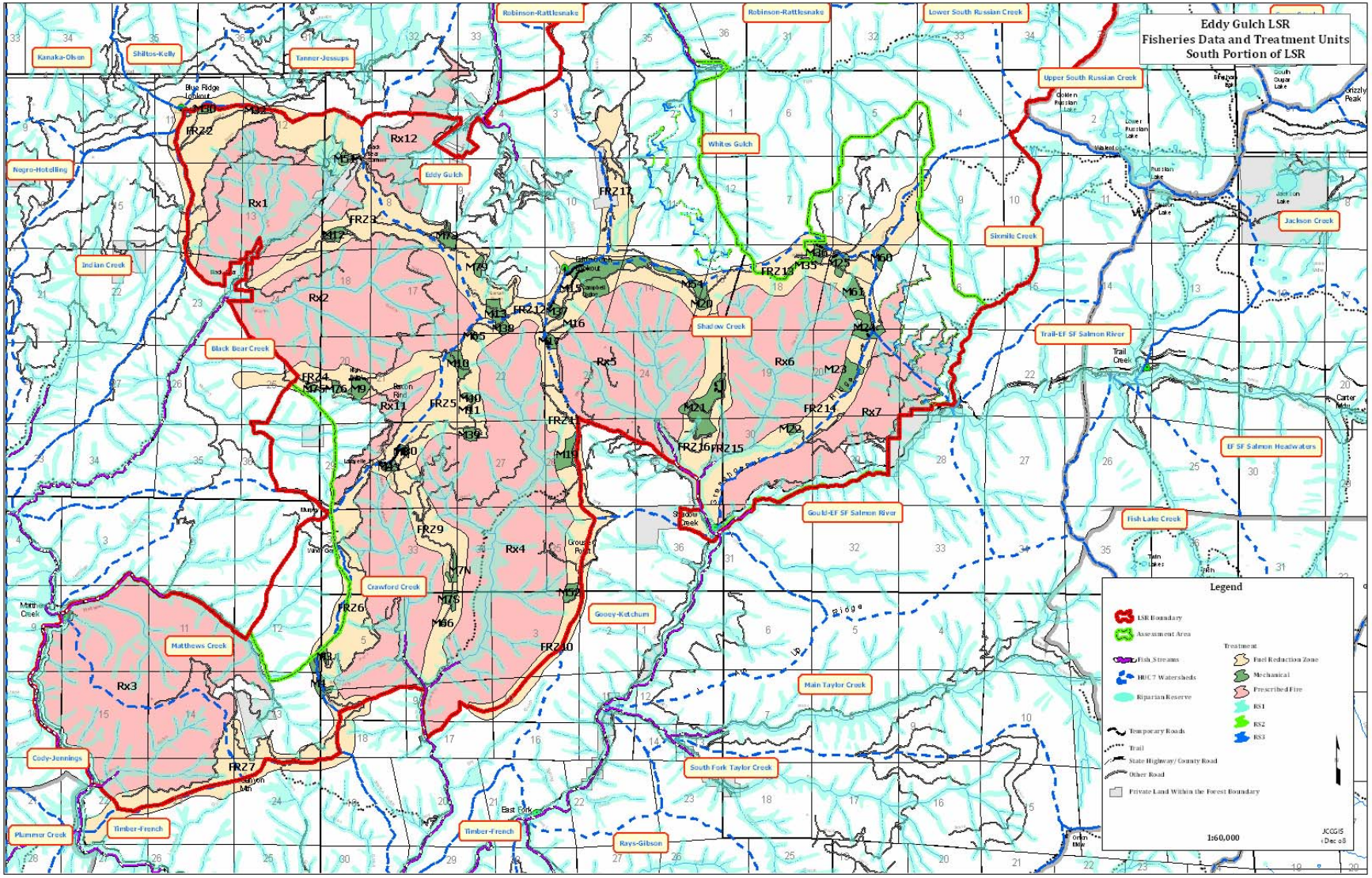


FIGURE C-1b. Locations of Proposed Actions for the Eddy Gulch LSR Project, Klamath National Forest.

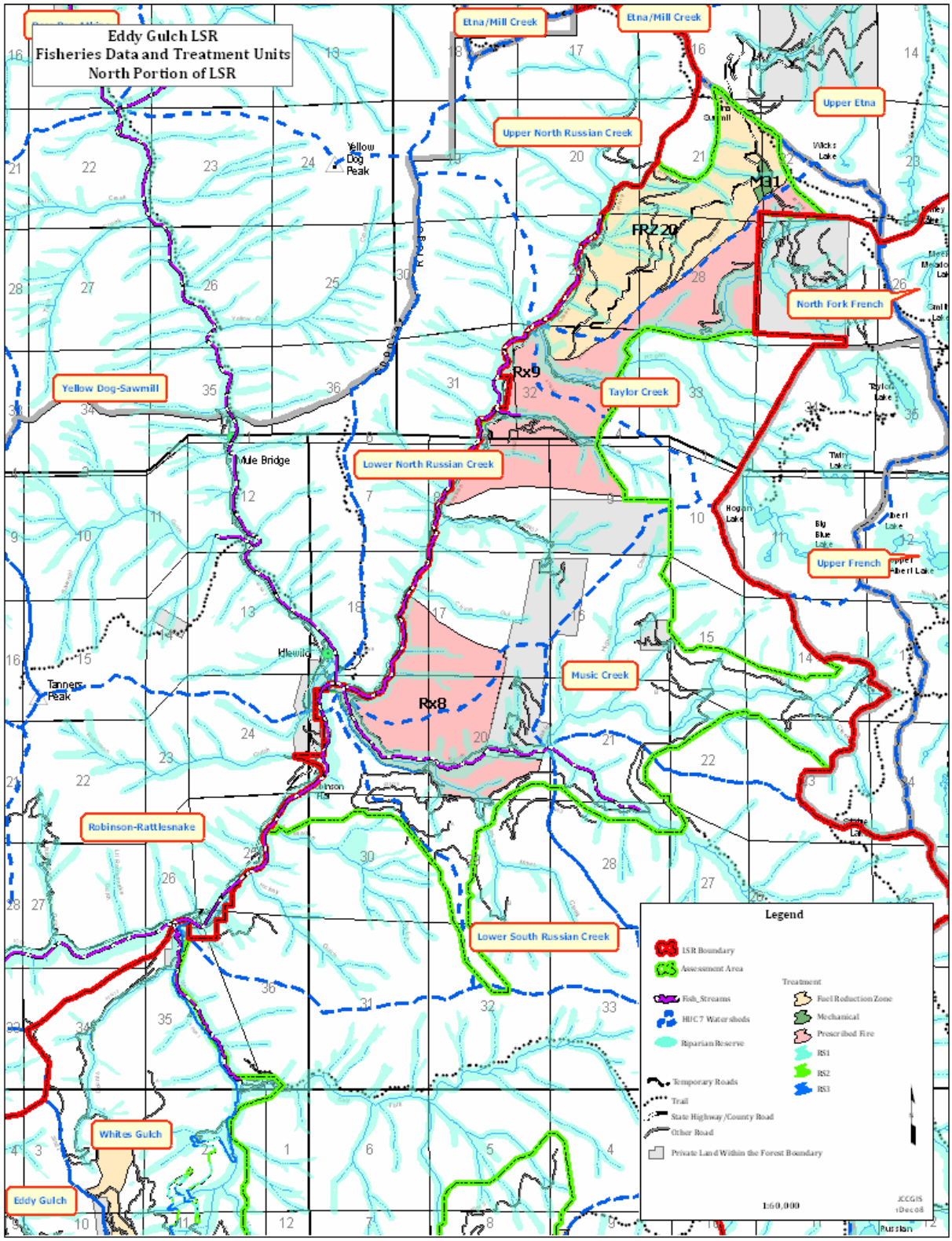


FIGURE C-2. Locations of water drafting sites for the Eddy Gulch LSR Project, Klamath National Forest.

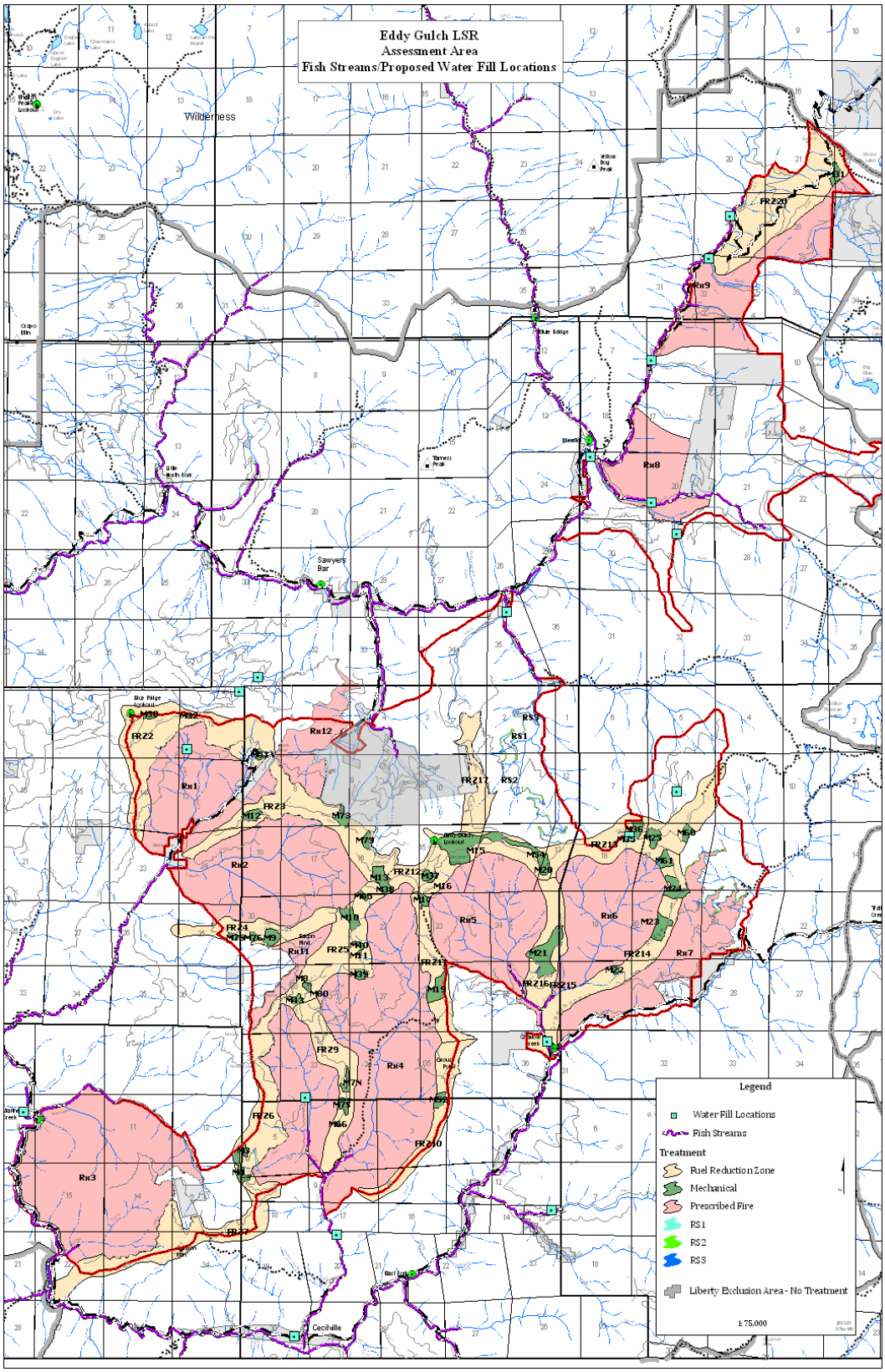
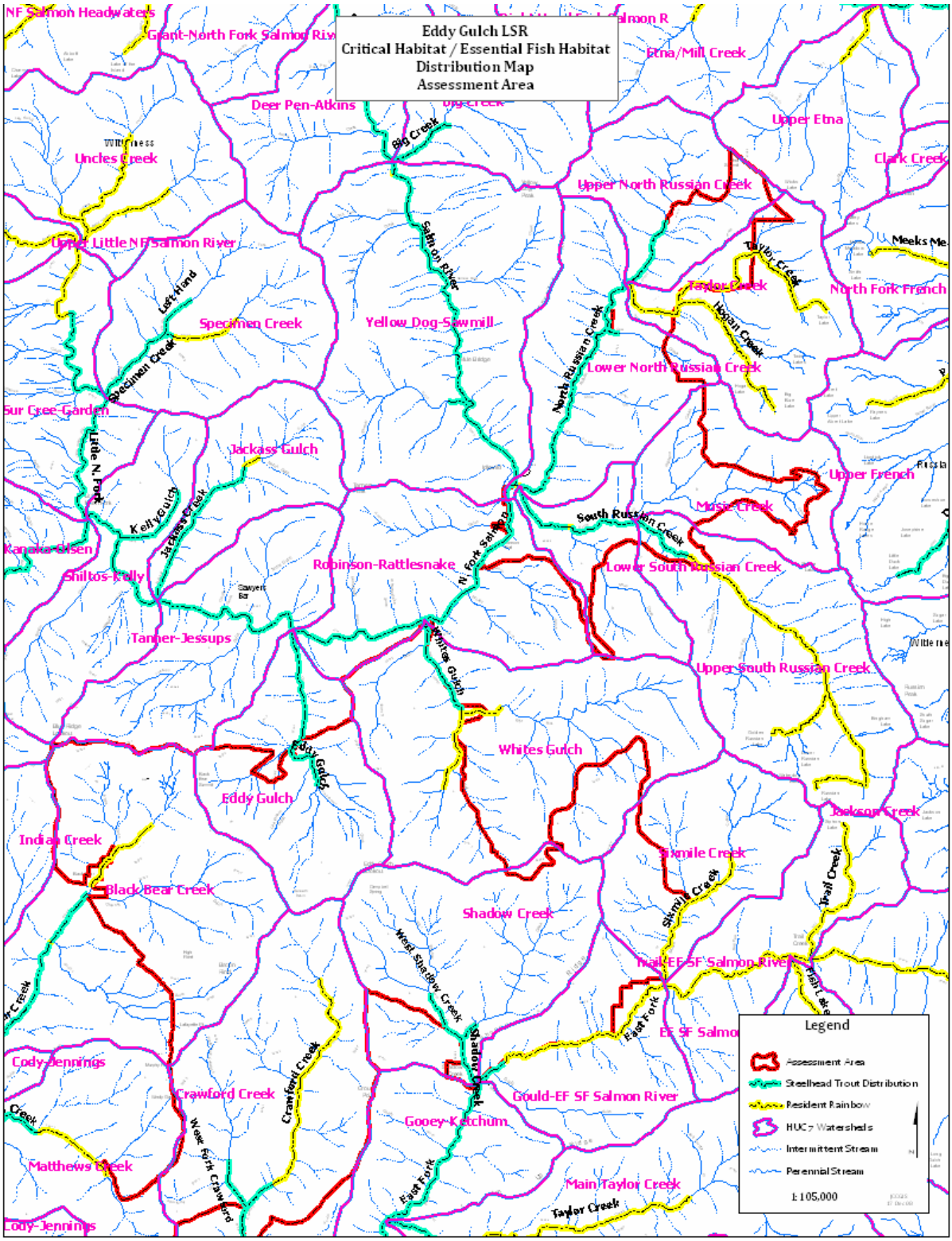


FIGURE C-3. Critical Habitat and Essential Fish Habitat, Eddy Gulch LSR Project, Klamath National Forest.



APPENDIX D

Resource Protection Measures for the Eddy Gulch LSR Project

APPENDIX D
Resource Protection Measures for the Eddy Gulch LSR Project

Fisheries Resource Protection Measures

The following shall be incorporated into the Proposed Action in order to meet the existing ESA programmatic consultation (USDA Forest Service 2001b) for fuels reduction projects:

1. When a masticator is used, the following guidelines will apply:
   a. The masticator will be operated on slopes of 45 percent or less.
   b. Soil moistures will be below 18 percent.
   c. The track-mounted excavator will not operate within 50 feet of any perennial/intermittent stream less than 1-foot wetted width; however, the arm of the masticator may reach within this 50-foot buffer to treat competing vegetation (approximately a 30-foot reach). For perennial streams greater than 1-foot wetted width, a 100-foot buffer will be designated. Consultation with the District fisheries biologist and/or hydrologist will occur to determine if any additional buffer width is needed for a particular hydrologic interim Riparian Reserve.
   d. The track-mounted excavator will not operate beyond break in slope of any inner gorge.
   e. Dry intermittent streams may be crossed by the track-mounted excavator/masticator at designated sites only after field review and approval by district fisheries biologist and/or hydrologist. No perennial streams will be crossed.

2. With the exception where using the masticator, fuels treatments on all units, within 30 feet of intermittent or perennial streams less than 1-foot wetted width, will be treated by lopping and scattering of slash when at least one of the following conditions exist:
   a. Units are located on granitic soils (or other highly erodible soils);
   b. Sideslopes entering the channels exceed 35 percent; or
   c. Soil cover estimates within 15 feet of the streams are less than 50.

3. Handpiling and pile burning may occur within 15–30 feet of intermittent or small perennial streams in areas where treatment units are not located on granitic soils, or where the sideslopes entering intermittent and small perennial channels do not exceed 35, or where soil cover estimates within 15 feet of the intermittent or small perennial streams are greater than 50. For perennial streams over 1-foot in wetted width, handpiling with no burning may occur within 15–30 feet of the streambank. The guidelines for this to occur are as follows:
   a. The contracting officer's representative or inspector will demonstrate through a series of appropriately placed plots, that estimated soil cover exceeds 50 within the adjacent 15-foot no-handpile buffer (15 feet adjacent to streambank);
   b. Handpiles will be spread out and not "stacked" above one another where during burning, they connect and affect a greater area than anticipated; or a linear area is developed that will increase the potential for erosion to occur;
   c. Handpiles will be small in size, 6 feet or less in diameter.

4. When underburning is prescribed, construction of handlines in Riparian Reserves closer than 25 feet to a watercourse shall be avoided where practical. Handlines construction in riparian vegetation shall be avoided where practical.

5. Handlines will be mitigated (water-barred and covered with organic material) immediately following prescribed burning, when safe to do so.

6. The project area includes some watersheds previously identified in the KNF LRMP or Watershed Analyses as "Areas With Watershed Concerns" (AWWCs: described in the LRMP Record of Decision). These included watersheds that were either over threshold relative to cumulative watershed effects (CWE) analyses or were of concern due to soils or other instabilities. Specifically, Black Bear Creek watershed was listed as an AWWC. Current CWE analysis and associated field reviews done by geologists and hydrologists for the Eddy Gulch LSR Project supersedes these previous program-level analyses because soils and watershed conditions were reviewed more site specifically in the field, and new CWE analyses were completed with updated information. Based on the current CWE analyses for the Eddy Gulch LSR Project, Black Bear Creek watershed is no longer an AWWC, but the following watersheds are considered AWWCs due to CWE results: Eddy Gulch (USLE), Indian Creek (ERA) and Kanaka-Olsen (GEO). Eddy Gulch has a USLE ratio of 1.05 due to the main road that parallels the creek within the Riparian Reserve. Indian Creek watershed is at 1.04 (ERA) due to the effects of past fires. Kanaka Olsen is at 1.53 (GEO) due to past fires and road density. Thus, hydrologists and geologists conducted field reviews to assess potential problem areas or indicators of cumulative watershed effects including the following: road erosion, road stream crossings, recent land slides, channel conditions, eroding streambanks, channel conditions at road crossings, and vegetative cover (aerial photo review). Based on CWE assessments and field reviews, the proposed Eddy Gulch LSR Project treatment units were located and designed to avoid and protect sensitive areas in these watersheds to ensure cumulative effects do not result in adverse effects on Proposed (or Listed) anadromous fish or their habitat. Indian Creek and Kanaka-Olsen Creek watersheds would have minimal treatments: Indian Creek would have 81 acres of FRZs treated along existing roads, no underburning, and no mechanical units; Kanaka-Olsen Creek would have 18 acres of FRZs treated along existing roads, no underburning, and no mechanical units. Eddy Gulch would have 423 acres of FRZs treated along existing roads, 521 acres of underburning, and 79 acres of mechanical units. The goal of calling out an AWWC in the planning process is to protect sensitive areas in these watersheds, such as unstable areas and aquatic resources, and to implement treatments that will improve watershed conditions and protect the watershed from further damage, in this case wildfire. While watersheds with high CWE values due to fires show recovery over the modeled period (through 2014 and 2021), the Eddy Gulch CWE (USLE) ratio will always remain high because of the main road that is in the Riparian Reserve. The proposed treatments were designed to reduce the effects of wildfire but would not reduce CWEs due to the main road in the Riparian Reserve.

7. To minimize the potential for cumulative adverse affects when underburning, no more than 10 percent of a 6th-field watershed will be burned in any one year.

8. In Riparian Reserves, prescribed fire effects would mimic a low-intensity backing fire, except for burning handpiles where higher intensity may occur to consume pile material.

9. Ignition of prescribed fire would occur in hydrologically defined Riparian Reserves only to minimize the potential for burning material to roll down into a reserve that would increase the potential for moderate- or high-intensity burns. Approval by the District fisheries biologist is needed.

10. When underburning in Riparian Reserves, at least 90 percent of the large woody debris will not be consumed, both standing and on the ground.

11. Field personnel and equipment will not enter waterways where anadromous fish are determined to be spawning or eggs would be incubating, as determined and indicated by a fisheries biologist. Restricted time periods are generally from October 15 through June 15. Additional restrictions may be appropriate for waterways containing Spring Chinook Salmon and summer-run steelhead, as determined by the District fisheries biologists. (Focus is protection of spawning and incubating eggs.)

12. For those actions within Riparian Reserves, and where currently over 80 percent shade exists, at least 80 percent shade on the water will be maintained after thin/fuels reduction operations.

13. During thin/release operations of the older units with larger conifers (greater than 20 years old), if any trees are felled within perennial stream channels or inner gorges, they will be left. However, the stream channels will not be overloaded with slash. Consultation of the District fisheries biologist and/or hydrologist will occur if trees are going to be felled within the stream channels and/or inner gorges.

14. Units that contain geologic Riparian Reserves (active landslides and toe zones) have been subject to field-based evaluation by a geologist or other earth scientist and silviculturist, and treatments have been designed to avoid these areas.

15. Best Management Practices (BMPs) and Wet Weather Operation Standards (WWOS) will be implemented during all activities tiered to this BA/BE (see below).

Aquatic Conservation Strategy (ACS) Objectives

ACS objectives 1, 3, 4, 5, 6, 8, and 9 pertain to this particular action. ACS objectives that may not pertain are 2 and 7. Spatial and temporal connectivity within and between watersheds (ACS Objective 2) would not be affected by these activities as very little to no activity would occur within anadromous reaches. In addition, floodplain inundation and water table elevation in meadows and wetlands (ACS Objective 7) would also not be affected by this activity because little to no activity would occur within these habitats.

1. The project maintains and restores the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.

   Thinning and underburning in M Units will move stands out of the dense, closed-canopy stage and accelerate the development of conditions found in pre-European late-successional forests. Thinning in M Units can also promote growth of residual conifers, resulting in stands dominated by larger trees.

3. The project would maintain the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

   Channel features would not change as a result of implementing BMPs, WWOS, standards and guides, and the mitigation measures outlined in the BA/BE.

4. The project would maintain water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

All mechanical tree removal would occur on ridgetops, removed from water courses. Water quality will be protected and have no changes as a result of implementing BMPs, WWOS, standards and guides, and the mitigation measures outlined in the PDS.

5. The project would maintain the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

   The sediment regime would not change as a result of implementing BMPs, WWOS, standards and guides, and the mitigation measures outlined in the BA/BE.

6. The project would maintain in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

   Peak/Base flows would have negligible changes due to the small number of units being treated during any one year in a particular drainage. Implementation of NMFS (2001) drafting guidelines would protect base flows during project implementation.

8. The project maintains and restores the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability.

   Thinning and/or underburning in M Units will move stands out of the dense, closed-canopy stage and accelerate the development of conditions found in pre-European late-successional forests. Thinning in M Units can also promote growth of conifers already present, resulting in a more diverse forest structure. Fuels hazard reduction would move treated stands towards being more resilient to wildfire, thereby reducing the probability of a stand-replacing wildfire and its effects.

9. The project would protect and maintain habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

   Underburning and/or thinning in M Units can move stands out of overly dense conditions and accelerate the development of conditions found in pre-European late-successional seral forests. Underburning and/or thinning in M Units can promote growth of conifers already present, resulting in a more diverse forest structure. Fuels hazard reduction can move the stand into being more resilient against wildfire, thereby reducing the probability of a stand-replacing wildfire event occurring in that particular stand, and an increased probability of the stand surviving the inevitable wildfire event.

   As a result of the increased growth that would be realized from the thinning in M Units, beneficial long-term water temperature effects could be evident sooner than if no thinning took place.

Other Resource Protection Measures

Treatment Stand Location

The project was designed by an interdisciplinary team to minimize surface erosion at the scale by

- locating stands near existing roads to minimize the need for road and landing construction,
- limiting new temporary road construction and locating them outside of Riparian Reserves.
- Adhering to the May 2002 Wet Weather Operation Standards (USDA Forest Service 2002a)
- Adhering to KNF LRMP Soil Cover Standards (USDA Forest Service 1995a).

Tractor, Mechanical Harvester, and Cable Yarding

- Dedicate no more that 15 percent of a stand to primary tractor skid trails, cable yarding corridors, and landings
- Skidding equipment will be generally restricted to slopes less than 35 percent and operate during dry soil conditions (dry down to 10 inches) or follow the May 2002 Wet Weather Operation Standards (USDA Forest Service 2002). There may be short sections of skid trails where slopes exceed 35 percent. Any sections of skid trails having slopes exceeding 35 percent will have slash or certified straw placed on them to achieve at least 90 percent soil cover.
- Skid trail locations will be designated by the KNF sale administrator/COR/Inspector prior to implementation. Skidding equipment will be confined to designated skid trails.
- Track-mounted masticators are limited to operation on slopes less than 45 percent.
- Minimize soil erosion by water-barring all skid trails, mulching with straw or fine slash (achieve 90 percent or greater cover) the last 25 feet of all skid trails where they enter landings or roads where needed.
- Logs will be suspended when being yarded across channels. Skid trail crossings of localized, hydrologically disconnected ephemeral channels (no Riparian Reserve present) will be uncommon and in such cases require remedial shaping.
- Prevent road runoff from draining onto skid trails, cable yarding corridors, or landings by use of waterbars, mulching with straw or fine slash, etc.
- Retain existing coarse woody debris whenever possible providing the amount of logs retained meets fuel management objectives.
- Meet the KNF LRMP Soil Cover Standards for each harvest unit as measured before the fall rainy season (late October). Post-treatment total soil cover should range from 60 to 70 percent depending on slopes steepness and fuel reduction treatments.

- At least 50 percent cover, as fine organic matter (less than 3 inch material), will be retained in all units.

Underburning, Hand Piling, and Pile Burning

The following measures are for protection of intermittent and perennial streams, springs, and active landslides and inner gorges.

- Prescribed fire will not be ignited in Riparian Reserves, but will be allowed to backdown into reserves. Underburning will be kept at a low-intensity backing fire adjacent to Riparian Reserves.

- If percent soil cover is below soil cover guidelines or predicted to be below after burning, ignition will cease at this point (see BMPs 6.2 and 6.3).

- Hand piles can be constructed 15–30 feet away from the wetted width of the stream channel if the stream channel is over 1-foot wide and the slope is less than 35 percent or if existing ground cover is greater than 50 percent. No pile burning can occur within 30 feet of perennial stream

- Hand piles will be spread out and not "stacked" above one another to keep them from connecting and affecting a greater area than anticipated during burning. Hand piles will not be closely aligned in any orientation that could increase the potential for erosion to occur.

- Hand piles will be small in size, 6 feet or less in diameter.

Roads and Landings

- Existing roads and landings will be used in order to minimize new construction.

- Roads will be cleared and graded, as necessary, to allow log truck and equipment access using minimum disturbance methods and minimum clearing widths.

- Erosion control measures described in BMP 1.13 will be applied to the new temporary roads and existing nonsystem roads that will be used during the project.

- The temporary roads will be outsloped where necessary to reduce erosion, covered with slash, if needed, and blocked after the harvest season (prior to the first winter after use). The temporary roads will be closed at project completion.

- New landing construction will not be done in Riparian Reserves, and landings will be shaped and treated for erosion control at the end of each season of use.

- Refueling and maintenance of project motorized equipment will occur at least 200 feet away from any channel.

Hazard Tree Removal

- A tree is considered a hazard if all or a portion of the tree has a high potential to fall or roll onto a roadway or facility and cause personal injury or property damage. Distance to trees

on the uphill side may exceed one tree height if they are likely to roll or slide onto the roadway, site, or facility (that is, there are insufficient barriers to prevent trees from reaching the roadway, trail, or facility). The hazard tree identification process will be used for trees along road systems.

- Hazard trees that require felling in Riparian Reserves are routinely left on site. These trees may be needed to maintain and/or restore large woody debris function and abundance within the reserves.

- Naturally fallen or felled hazard trees may be removed from Riparian Reserves under the following circumstances:

  – Trees must be removed to provide safe road passage or campground access; OR

  – The trees would pose a substantial risk to the forest road drainage system integrity, AND

  – A fisheries biologist determines through site inspection and written documentation that removal of individual hazard trees within interim Riparian Reserves is not inconsistent with the Aquatic Conservation Strategy Objectives. Removal would only be appropriate when a local area survey of the affected Riparian Reserve clearly indicates that the functioning level with respect to large woody debris would not change from current levels after individual tree removal (USDA Forest Service 2002a).

Water Drafting

- All project water drafting will follow NOAA-Fisheries Water Drafting Specifications (USDC NMFS Fisheries 2001), including but not limited to the following:

  – Drafting will not reduce the stream flow by more than 10 percent.

  – When water is drafted intakes will be screened with 3/32 inch mesh (for rounded or square openings) or 1/16 inch mesh for slotted opening.

  – Pumping rate shall not exceed 350 gallons per minute or 10 percent of the stream flow.

  – Pumping will be terminated when the water tank is full.

- Water drafting for dust abatement on roads will occur at designated sites for that purpose. Erosion control measures will be employed on the access and/or main road to prevent water leakage from causing stream sedimentation. Hazardous material spill prevention and containment equipment will be present on water trucks. Water trucks and pumping equipment will be in a well-maintained condition, free of fluid leaks, and have hoses in good operation condition.

Equipment Refueling and Maintenance

- Refueling and maintenance of project motorized equipment will occur at least 200 feet away from any channel (USDA Service 2003).

- BMP 2.12 will guide all fueling and lubricating actions and, in particular, fuel containment systems will be in place on landings as necessary.

Riparian Reserves

Mapped Riparian Reserves are shown on the project map (refer to Appendix C). One site-potential tree height as per the project area is 170 feet on each side of a qualifying stream channel. The Record of Decision on the Northwest Forest Plan defined standard slope distance for Riparian Reserves as two site-potential tree heights or 300 feet for anadromous and resident fish-bearing streams (whichever is greater) and one site-potential tree height or 150 feet for nonfish-bearing streams (whichever is greater), the Riparian Reserve width of 340 feet for fish-bearing streams and 170 feet on each side of an active stream channel for nonfish-bearing streams will be used.

No ground-disturbing yarding equipment will be allowed to enter Riparian Reserves, with the exception of road crossings within the reserves. Possible hazard tree felling from Riparian Reserves is described above.

Best Management Practices

This section describes the BMPS that are applicable to the Eddy Gulch LSR Project.
BMPs were developed to comply with Section 208 of the *Clean Water Act*. BMPs have been certified by the State Water Quality Resources Control Board and approved by the United States Environmental Protection Agency as the most effective way of protecting water quality from impacts stemming from nonpoint sources of pollution. These practices have been applied to forest activities and have been found to be effective in protecting water quality within the KNF. Specifically, effective application of the Region 5 Forest Service BMPs has been found to maintain water quality that is in conformance with the Water Quality Objectives in the North Coast Regional Water Quality Control Board's (NCRWQCB) Basin Plan (www.swrcb.ca.gov/agendas/2005/march/0302-06.doc).

Region 5 Forest Service BMPs have been monitored and modified since their original implementation in 1979 to make them more effective. Numerous on-site evaluations by the NCRWQCB have found the practices to be effective in maintaining water quality and protecting beneficial uses. The KNF monitors the implementation and effectiveness of BMPs on randomly selected projects each year. BMP effectiveness requirements were met on 90 to 100 percent of the sites sampled in 2002 to 2006. The average BMP effectiveness was 97 percent. Results of this monitoring can be found on the Klamath National Forest Web page (USDA Forest Service 2003, Best Management Practices Report).

The following list of BMPs will be implemented for the Eddy Gulch LSR Project. A description of the objective of each BMP is included, as well as how each practice will be specifically implemented within the project. For additional information on the BMPs and their objectives, see Water Quality Management for Forest System Lands in California.

BMP 1.1 – Timber Sale Planning Process: Requires the Interdisciplinary (ID) team to consider methods of reducing water quality impacts during the planning phase of a project. The methods are implemented during the planning process of the Timber Sale project.

- For determining Riparian Reserve buffer widths, one site-potential tree height was designated as 170 feet for the project.
- Stream shading will not be reduced below 80 percent to maintain water temperature.
- Masticating equipment may operate on slopes up to 45 percent.
- Tractor yarding equipment is generally limited to slopes less than 35 percent.

- Existing skid trails will be reused whenever possible.
- Existing landings will be reused whenever possible.
- Tractor skidding will occur on designated skid trails. Tractors may leave skid trails to access isolated logs if ground conditions permit. End-lining will be employed on slopes greater than 35 percent (see also BMP 5.2).
- The temporary roads will be outsloped where necessary to reduce erosion and blocked after the harvest season (prior to the first winter after use). The temporary roads will be closed at project completion.
- Water drafting sites are existing sites and rocking of approaches will be used as required; all boards and plastic will be removed after use.
- Watershed personnel reviewed all proposed landings and new roads in the field to determine if unstable areas or other watershed issues were present and documented findings in project reports.
- Unstable areas will be reviewed by an earth scientist prior to actual landing construction and mitigated or avoided.
- Swing Boom Yarding will be required within the timber sale contract to help alleviate the need to enlarge existing landings or construct additional landings.

BMP 1.2 – Timber Harvest Unit Design: Requires the ID team to consider methods of reducing water quality impacts due to changes in unit design. This is accomplished during the planning phase of a project. Examples of design changes are restricting timing of tree removal and utilizing less impacting yarding systems.

- The ID Team reviewed all units to select harvest methods appropriate to site conditions.
- Tractor yarding equipment is generally limited to slopes less than 35 percent. This is incorporated into the unit layout. Equipment will be kept approximately 50 feet from the break in slope to the wetted channel or inner gorge of intermittent streams channels.

BMP 1.3 – Use of Erosion Hazard Rating for Unit Design: Identifies high or very high erosion hazard areas and adjust management activities to prevent downstream water quality impacts; and to increase soil cover for those areas that have a high risk of contributing sediment into streams. This is done during the planning and layout phase of the project.

- Based on field review and site data (percent of slope distribution, soil texture), the Forest Soil Scientist determined the surface erosion hazard rating for each treatment unit and prescribed logging systems and soil cover needs based on the erosion hazard rating.
- Some unit boundaries were defined by equipment slope limitations for skidders at 35 percent.

BMP 1.4 – Use of Sale Area Maps for Designating Water Quality Protection: Identifies sensitive areas and water uses as part of the Timber Sale contract to assist operators in locating water concerns and applying protection methods. This is accomplished during contract preparation and implemented during layout of the sale.

- All protected stream courses will be illustrated on the Sale Area Map.
- Water drafting will be from existing drafting sites and will be identified on the Sale Area Map.
- Units that use tractor yarding will be designated on the Sale Area Map.

BMP 1.5 – Limiting Operating Period of Timber Sale: To prevent soil compaction and erosion from operations during wet weather; and to ensure placement of erosion control structures prior to the onset of winter to reduce water quality impacts. This is accomplished during the timber sale operations.

- The project is proposed to take place during the normal operating season (NOS) that is defined as April 15 to October 15 and in dry periods outside the NOS with Line Officer approval. Activities will be restricted during periods of wet weather during the NOS.
- When stormy weather is predicted, the Timber Sale Administrator (TSA) will be on site to ensure that winterization or erosion control procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.
- Forecast periods will be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur.
- The Wet Weather Operation Standards will be used to guide operations, especially haul, during periods of wet weather. The TSA will examine field conditions to determine when the soil and/or road have dried out enough to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the TSA who will provide direction to the Contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided.

BMP 1.6 – Protection of Unstable Lands: Provides for special treatment of unstable areas to avoid triggering mass slope failure with resultant erosion and sedimentation.

- Project watershed personnel conducted field reviews of all proposed harvest units, identified unstable areas observed in the field, reviewed the marking prescription, and documented findings in project reports.
- Unstable lands will be identified on the Unit Information Cards, and equipment will be excluded from them.
- Project watershed personnel will be available for consultation during project implementation when activities occur in or adjacent to unstable areas.

BMP 1.8 – Streamside Management Zone (SMZ) Designation: Designates zones adjacent to water and/or riparian areas as zones of special management. This is accomplished during the planning and layout phase of the project.

- Riparian Reserves within the project area have been designated; the ID Team identified one site-potential tree height as 170 feet.
- Existing landings within 50 feet of the slope break to a stream channel or inner gorge will not be used.
- Sites for water drafting for dust abatement will be designated by the Forest Service and agreed to by the purchaser. Water drafting will meet the NOAA 2001 design standards when drafting from anadromous fish bearing stream reaches.
- There will be no yarding of trees or logs, through, in, or across stream channels.
- For all units where thinning is prescribed in Riparian Reserves associated with intermittent stream channels, equipment will not operate within 50 feet of the break in slope to the wetted channel or inner gorge of intermittent streams.
- Where a clear break in slope is not evident, equipment will not operate within 50 feet of the wetted channel of any intermittent stream.

BMP 1.9 – Determining Tractor Yarding Ground: Minimize erosion and sedimentation resulting from ground disturbance of tractor yarding systems.

- The Forest soil scientist field reviewed the tractor yarding units to verify that they were reasonable to tractor yard from a soil resource perspective based upon the combination of percent slope distribution, soil properties, and erosion hazard rating.
- Project design features, such as restricting skidding equipment to slopes generally less than 35 percent and using endlining on slopes over 35 percent will minimize disturbance to the steeper slopes in tractor units.

BMP 1.10 – Tractor Skidding Design: Designates a tractor skid pattern to avoid oversteepened areas, designates tractor crossings, and reduces skid patterns in sensitive areas to reduce erosion and compaction. This is accomplished during the sale layout and operations phase of the project.

- Existing skid trails will be reused whenever possible.
- Skidding occurs generally on slopes less than 35 percent
  - If sections of skid trails have slopes exceeding 35 percent, slash or certified straw will be placed on them as determined necessary by the TSA.
- The location of operating slopes for ground-based harvest systems will have a Forest Service representative design and approve areas for logging equipment to work and an earth scientist will provide recommendations if needed.

- Skid trails that intersect Forest Roads will be obliterated at the intersection.

- The location of new skid trails within Riparian Reserves associated intermittent streams will be by agreement between the Timber Sale Contractor and the TSA. Perennial streams will not be crossed by skid trails. Intermittent channels may be crossed when dry and at locations designated by the Forest Service.

- Limit equipment disturbance within 20 feet on either side of swales, minimize equipment crossings, and avoid running trails up the axis of swales.

BMP 1.11 – Suspended Log Yarding in Timber Harvesting: Protect the soil mantle from excessive disturbance, maintain the integrity of the SMZ and other sensitive watershed areas, and control erosion on cable corridors.

- All cable yarding units will require one end suspension. Full suspension will be required for any yarding across or over streams.

- Ground-based skidding will require front-end suspension of logs on skid trails.

BMP 1.12 – Log Landing Location: Locate new landings or reuse existing landings in such a way as to avoid watershed impacts and associated water quality degradation.

- New and old landings would be selected for use that involves the least amount of excavation and the least erosion potential.

- Landing design standards:

  – Existing landings will be used to the extent possible.

  – Do not use existing landings within 50 feet of the slope break to a stream channel or inner gorge.

BMP 1.13 – Erosion Prevention and Control Measures during Timber Sale Operations: Ensures that Purchaser's operations shall be conducted reasonably to minimize soil erosion. This is accomplished during the pre-operations meeting with the purchaser and throughout the operations phase of the timber sale.

- Erosion control measures are discussed during the pre-operations meeting with the purchaser and the Forest Service. They are updated throughout the operations phase of the timber sale.

- During project implementation, final locations and design characteristics for landings and new roads will be reviewed by watershed personnel prior to construction as needed.

- The project earth scientist will make periodic inspections of the sale to ensure that the erosion control measures are having the desired effect and are in compliance with BMPs. The earth scientist will make recommendations to the Forest Service Representative as to any action needed to comply with BMPs.

- The Klamath WWOS (USDA Forest Service 2002a) will be used.

- Storms may temporarily suspend operations to ensure BMP compliance and to avoid adverse impacts to Threatened and Endangered species or species of concern (Region 5 sensitive).

- When stormy weather is predicted, the TSA will be on site to ensure that winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- Also see BMPs 1.5 and 1.11.

BMP 1.16 – Log Landing Erosion Prevention and Control: Works to reduce erosion and subsequent impacts of sedimentation from log landings. Timber Sale Contract provides for erosion prevention and control measures on all landings. This is best done by design of landing drainage measures during the planning phase of the project, and implemented during the operations phase.

- Proposed landings were identified on the project planning map and were evaluated by earth scientists.

- Landings are shaped to disperse drainage and direct runoff away from watercourses at the time of construction. Rock armoring and silt fences with straw bales may be used as necessary to direct water to areas of suitable drainage and to capture sediment. All new landing cut and fill slopes will be mulched and the mulch will be maintained throughout the life of the project.

- The project will use existing landings whenever possible. Swing Boom Yarding will be required within the timber sale contract to minimize the need to construct new landings.

- Existing landings that will be used for the project will not be located within Riparian Reserves and will be kept as small as feasible, while meeting safe working standards.

BMP 1.17 – Erosion Control on Skid Trails: Employs preventive measures such as drainage structures to reduce water concentration and erosion. This is accomplished during the operations phase of the project. Because of the timing of this project, pre-staging of straw bales for timely construction of water bars will be called for.

- No full-bench skid trails will be constructed (full-bench skid trails have the entire skid trail cut into the hill slope).

- Each skid trail will be water-barred before the sale is completed.

- Skid trails that intersect National Forest System roads will be obliterated at the intersection.

- Skid trails that cross dry swales (that is, depressions in the landscape that do not meet definition for a designation as an Riparian Reserve) will be restored before any storm (with reasonable chance of causing offsite sediment movement) or after use is complete. This

generally consists of removing excess soil, reshaping and water-barring former approaches, and spreading slash on the former crossing.

- Tractor skidding will be done when soil moisture conditions are dry within 4 inches of the surface on existing skid trails and dry to 10 inches of the ground surface off skid trails.

- Cable yarding corridors will be water-barred.

BMP 1.19 – Streamcourse Protection: Protects the natural flow of streams and reduces the entry of sediment and any other pollutants into streams. The location of stream crossings must be agreed to by the Sale Administrator and the Hydrologist. The accomplishment of the objective of this measure is during the operations phase of the project.

- Service landings are located away from channels. Fuel containment systems will be used at all landings.

- Skid trails will be a minimum of 50 feet from the break in slope to the wetted stream channels or the inner gorge.

- Straw bales, rock, and containment dikes will be used as needed at water drafting sites and service landings to capture any spilled water and prevent runoff to streams.

- There will be no yarding of trees or logs below the break in slope or in inner gorge areas.

BMP 1.20 – Erosion Control Structure Maintenance: Requires periodic inspection of erosion control structures to assess maintenance needs and effectiveness. This is accomplished during the operations and post-operations phase of the project; this ensures the adequacy of erosion control measures.

- When stormy weather is predicted, the TSA will be on site to ensure that winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- The TSA will examine field conditions to determine when the soil and/or roads have dried out enough to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the TSA who will provide direction to the Contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided.

- Temporary roads will be graded to outslope.

- A barrier to prevent vehicle traffic and use will be placed at all temporary road takeoffs at the end of the operating season.

- Temporary roads will be water-barred after use and then will be closed at the end of the project.

- Klamath WWOS guidelines will be followed. Spot rocking will be used, as necessary, if small and isolated portions of the road system do not adequately dry to allow haul when most of the road is capable of haul, provided haul over the newly rocked areas will not create adverse impacts, such as sediment moving off site towards channels.

BMP 1.21 – Acceptance of Erosion Control Measures Before Timber Sale Closure: Erosion control measures are inspected for adequacy to ensure erosion control as planned. This is accomplished during the post-operations phase of the project during the contract final inspection.

- Landings will be shaped for drainage.
- Landings that will not be used again will be contour ripped and covered with slash or weed free straw if necessary.
- At project completion, permanent operating water bars will be installed and/or repaired, as necessary, on all skid trails and slash scattered on all skid trails if necessary available.
- Temporary roads will be graded to outslope and covered with slash if needed at termination of activities during the season of use.
- A barrier will be placed at the takeoff of the temporary roads.

BMP 1.25 – Modification of the Timber Sale Contract (as needed): Allows Contract language to be modified to add or increase protection of water quality not identified in the planning process.

- Modifications are not expected at this time, but this BMP is retained to illustrate that contract alteration will occur if needed to ensure maintenance of water quality, especially if unforeseen circumstances and impacts occur.

BMP 2.1 – General Guidelines of the Location and Design of Roads: To locate and design roads with minimal resource damage.

- Road construction will be designed:
  - For minimal cut and fill
  - On or near ridges
  - On gently sloping ground
  - Outside RRs
- Temporary roads were identified on the project planning map and were evaluated by earth scientists.

BMP 2.2 – Erosion Control Plan: The objective is to limit and control sedimentation through effective planning prior to the initiation of construction activities and through effective contract administration. This is accomplished during the pre-operations and operations phase of the project.

- The ID Team incorporated resource protection measures into the Proposed Action, and these measures are then incorporated into the contract specifications and provisions. Examples are most of the actions described above and include such items as shaping

landings, temporary roads, and skid roads for drainage and use of rock as necessary to obtain suitable haul bases on National Forest System roads.

- When stormy weather is predicted, the TSA will be in contact with the sale administrator to ensure winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- The WWOS guidelines will be used to guide operations, especially haul, during periods of wet weather. The TSA will examine field conditions to determine when the soil and/or roads have dried out enough to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the TSA who will provide direction to the Contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided.

BMP 2.3 – Timing of Construction Activities: The objective is to minimize erosion by conducting operations during minimal runoff periods. This is accomplished during the operations phase of the project by the contract administrator and the project earth scientist.

- All new temporary road and all existing former logging access route, landing, and operation spur reconstruction, will be conducted during appropriate periods of weather and soil moisture to ensure BMP attainment and the avoidance of adverse impacts on listed species. Forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur.

- When stormy weather is predicted, the TSA will be on site to ensure that winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- The WWO Guidelines will be used to guide operations, especially haul, during periods of wet weather. The TSA will examine field conditions to determine when the soil and/or roads have dried out enough to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the TSA who will provide direction to the Timber Sale Contractor as to when operations may resume to insure that BMPs will be met and adverse impacts will be avoided.

BMP 2.4 – Road Slope Stabilization (Preventive Practices): The objective is to improve road slope stabilization by applying mechanical and vegetative measures. This is accomplished during the operations phase of the project.

- All landings, temporary road, and skid trail construction, and road re-conditioning will be conducted during appropriate periods of weather and soil moisture to ensure BMP attainment and the avoidance of adverse effects on listed species. Favorable forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur.

- Landings will be shaped for drainage at the time of construction. Rock armoring and silt fences with straw bales will be used, as necessary, to direct water to suitable areas of drainage and to capture sediment. All landing cut and fill slopes will be straw mulched and the mulch is maintained throughout the life of the project.

- WWOS will be followed. Rocking will be used as necessary.

- Temporary roads will be closed and storm-proofed when not in use (steeper segments will be mulched as needed). Temporary roads will be closed following completion of fuels reduction activities.

BMP 2.5 – Road Slope Stabilization (Administrative Practices): The objective is to reduce sedimentation by minimizing erosion from road slopes and by minimizing the chances of slope failures along roads. This is accomplished by road design measures during the planning phase of the project.

- Klamath WWOS guidelines will be followed.

- When stormy weather is predicted, the TSA will be on site to ensure that winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- The WWOS Guidelines will be used to guide operations, especially haul, during periods of wet weather. The TSA will examine field conditions to determine when the soil and/or roads have dried out enough to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the TSA who will provide direction to the Contractor as to when operations may resume to insure that BMPs will be met and adverse impacts will be avoided.

BMP 2.11 – Minimization of Sidecast Material: The objective is to minimize sediment production originating from material sidecast during road construction or maintenance. This is accomplished during the design phase of the project by the contract inspector.

- Minor blading will occur on temporary roads used by the project. Side-casting of soil during blading operations will be minimal due to the low gradient slopes on which the temporary roads are located.

- During reconstruction of any landings, material will not be sidecast where it can enter a stream channel.

BMP 2.12 – Servicing and Refueling of Equipment: The objective is to prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials from being discharged into or near rivers, streams, impoundments, or natural and manmade channels that lead into them. This is accomplished through the use of designed and designated refueling areas.

- Fuel containment systems will be in place on landings as necessary.

- Refueling and maintenance of project motorized equipment will occur at least 200 feet away from any channel.

BMP 2.16 – Stream Crossings on Temporary Roads: The objective is to ensure that temporary roads do not unduly damage stream channels and to ensure that fish passage is unimpeded by stream crossing structures.

- The number of crossings is kept to a minimum needed for access.

- Temporary crossings will be removed and the site stabilized prior to any storm (that is, when there is significant potential for offsite sediment movement) or when the facility is no longer needed, whichever is earliest.

BMP 2.21 – Water Source Development Consistent with Water Quality Protection: The objective is to limit and mitigate the effects of water source development through the planning of impoundments and withdrawals.

- Drafting sites are existing sites and rocking of approaches will be used as required. All boards and plastic will be removed after use. Straw bales, rock surfacing, and containment dikes will be used at all locations where the possibility of water spill or overflow will result in sediment being moved toward the creek.

- Drafting sites and methods will follow USDC NMFS (2001) direction, including screen size and the amount of flow withdrawal guidelines when drafting from anadromous fish bearing stream reaches.

- Water trucks will be required to remain on existing rocked roads.

BMP 2.22 – Maintenance of Roads: The objective is to limit sedimentation and erosion by road drainage maintenance and road surface protection. This is accomplished during the operations phase of the project and the post-operations final inspection.

- The Klamath WWOS guidelines will be followed. Spot rocking will used, as necessary, if small and isolated portions of the road system do not adequately dry to allow haul when most of the road is capable of haul, provided haul over the newly rocked areas will not create adverse impacts, such as sediment moving offsite towards channels.

- When stormy weather is predicted, the TSA will be on site to ensure that winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- The WWOS guidelines will be used to guide operations, especially haul, during periods of wet weather. The TSA will examine field conditions to determine when the soil and/or road has dried out enough to enable operations to resume without risk of watershed impacts. The project earth scientist may be called on to make recommendations to the TSA, who will provide direction to the Contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided.

- Appropriate road watering will occur as roads dry to maintain road fines on site.

BMP 2.23 – Road Surface Treatment to Prevent Loss of Materials: The objective is to reduce road-related erosion through treatment of the road surface, usually through spot rocking and dust abatement. This is accomplished during the operations phase of the project.

- The Klamath WWOS will be used for all project activities (harvest, hauling, planting). The public uses many roads in the analysis area throughout the year, and control of this use is outside the scope of the project or the KNF's jurisdiction.

- Spot rocking will used, as necessary, if small and isolated portions of the road system do not adequately dry to allow haul when most of the road is capable of haul, provided haul over the newly rocked areas will not create adverse impacts, such as sediment moving offsite towards channels.

- Landings will be outsloped where necessary to reduce erosion and rocked, if necessary, to improve drainage away from existing channels.

- The WWOS dictate conditions that control ground-disturbing operations. For example, if more than 10 percent of a road segment is rutted 2 inches in depth, road use will be suspended.

- TSAs will be on-site daily when new locations and conditions are encountered and to ensure that appropriate winterization procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- A Dust Abatement Plan is required under the Timber Sale Contract, Specification CT5.4, under road maintenance. Roads to be dust abated with water will be specified in the contract by project engineer.

- Appropriate road watering on other project roads will occur as roads dry to maintain road fines on site.

BMP 2.24 – Traffic Control During Wet Periods: The objective is to reduce damage to road drainage and limit sedimentation from roads during wet periods. This is generally achieved by increased surfacing and/or road closures during the operations phase of the project.

- The Klamath will be used for all project activities (hauling, fuel treatment, road opening, and road closure), but the public uses many roads in the project area throughout the year.

- The dictate conditions that control ground-disturbing operations. For example, if more than 10 percent of a road segment is rutted 2 inches in depth road use will be suspended.

BMP 2.26 – Obliteration or Decommissioning of Roads: The objective is to reduce sediment generated from temporary roads, unneeded system (classified), and nonsystem (unclassified) roads by obliterating or decommissioning them at the completion of the intended use.

- This BMP applies to all temporary roads

- Roads are to be drained by measures such as re-contouring or outsloping to return the road prism to near natural hydrologic function.

- Road prisms requiring more sediment reduction would be stabilized through appropriate treatment such as tillage, ripping, fertilization, and/or revegetation.

- Road take-offs would be obliterated or effectively blocked to vehicle access.

BMP 5.2 – Slope Limitations for Mechanized Equipment Operations: The objective is to reduce gully and sheet erosion and associated sediment production by limiting tractor use.

- Skidding equipment (track or rubber tired) would be generally restricted to slopes less than 35 percent.

- Masticating equipment may operate on slopes up to 45 percent.

BMP 5.4 – Revegetation of Surface Disturbed Areas: The objective is to protect water quality by minimizing soil erosion through the stabilizing influence of vegetation. This is accomplished during the operations and post-operations phase of the project.

- Temporary roads that are closed will be mulched and seeded in areas that have high erosion potential.

- Steep (over 35 percent) portions of skid trails will be covered with slash as needed.

BMP 5.5 – Disposal of Organic Debris: The objective is to prevent gully and surface erosion with associated reduction if sediment production and turbidity during and after treatment.

- Hand pile and pile burning, underburning, and mastication would be used to reduce the fine fuel component. Specified soil cover recommendations will be used to maintain sufficient soil cover for erosion prevention.

BMP 5.6 – Soil Moisture Limitations for Tractor Operations: The objective is to prevent soil compaction, rutting, and gulling that may result in increased sedimentation and turbidity.

- This is accomplished during the operations phase of the project by periodic monitoring performed by the project's earth scientist.

- Tractor skidding will only be permitted when soil moisture is dry within the top 4 inches of the soil surface on main skid trails and 10 inches when skidding off-skid trails.

- Tractor operations will generally occur where slopes average less than 35 percent in slope. Some end-lining will occur on steeper slopes, but these areas will be very limited in size and extent. Tractor operations will be restricted to designated skid trails and use end-lining, which will limit the amount of area impacted.

- When stormy weather is predicted, the TSA will be in contact with the sale administrator to ensure winterization procedures are implemented in a timely fashion and to initiate

shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- The WWOS will be used to guide operations, especially haul, during periods of wet weather. Earth scientists will examine field conditions to determine when the soil and/or road have dried out enough to enable operations to resume without risk of adverse watershed effects. The earth scientist and/or fisheries biologist will make recommendations to the TSA and to the District Ranger, who will provide direction to the Timber Sale Contractor as to when operations may resume to ensure that BMPs will be met and adverse effects will be avoided.

- Mastication will occur when the soil is dry down to 10 inches.

BMP 6.1 – Fire and Fuels Management Activities: The objective is to reduce the effects of wildfires on water quality by informing the public and the development of access plans, fuel breaks, and fuel reduction programs. This will be done through ongoing fire management program work.

- The District fuel/fire department helped determined acceptable levels of slash to retain on the site following harvest activities and also to identify areas and methods to remove standing slash of a sub merchantable size, that otherwise would create an unacceptable fire risk.

- Ongoing fire management work maintains fire access plans and restricts public activities, such as woodcutting, on days when fire weather predictions indicate significant risk from such activities in the project area.

BMP 6.2 – Consideration of Water Quality in Formulating Fire Prescriptions: The objective is to provide for water quality while achieving management objectives of prescribed fire. This is done during the planning phase of the project.

- The different fuel reduction treatments are being used because of soil and water quality considerations.

- All burning will be done under an approved Burn Plan that specifies a burn prescription for each area. These prescriptions will account for fuel loading, fuel moisture, soil moisture, slope, aspect, etc., and will result in the desired quantity of fuel consumed for each prescribed burn. A fuel management specialist, who may utilize recommendations from a soil or earth scientist, will prepare prescriptions.

- Hand piles will burn under controlled settings to contain fire spread.

- Underburning will occur under prescription, occurring in conditions that allow safe burning. Fire crews, equipped to control fire spread, will monitor underburning.

- Fire prescriptions will be reviewed by the ID Team and will be approved by the line officer.

BMP 6.3 – Protection of Water Quality from Prescribed Fire Burning Effects: The objective is to minimize surface erosion, protect soil productivity, and prevent soil and debris from entering

streams. This is achieved by a combination of methods appropriate for the site-specific conditions, including requiring adequate ground cover to reduce surface erosion and impedance of overland flow, avoiding high intensity burns, and maintaining the integrity of SMZs.

- Retain recommended ground cover to keep soil erosion in the burned site within the limits of the burn plan and LRMP guidelines for soil cover (KNF LRMP Table 4-2).

- Maintain the integrity of the Riparian Reserve.

- If it is determined necessary for a handline to be constructed as a control point within a Riparian Reserve, it should be constructed no closer than 30 feet to a watercourse. Handline construction in riparian vegetation shall be avoided where practical.

BMP 7.7 – Management by Closure to Use: Exclude activities that could result in damages to either resources or improvements, such as roads and trails, resulting in impaired water quality.

- The Eddy Gulch LSR Project is proposed to take place during the NOS that is defined as April 15 to October 15 and in dry periods outside the NOS with Line Officer approval. Activities will be restricted during periods of wet weather during the NOS.

- The Klamath WWOS will be used; however, public use of most roads within the Assessment Area occurs throughout the year. The Wet Weather Operations Standards and Field Guide, revised May 16, 2002, is incorporated by reference and on file in the project record.

- Storms may make it necessary to temporarily suspend operations to ensure BMP compliance and to avoid adverse effects to Threatened, Endangered, or Sensitive species. When stormy weather is predicted, the TSA will be on site to ensure that winterization or erosion control procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.

- In Riparian Reserves, prescribed fire effects will mimic a low-intensity backing fire, except for burning handpiles where higher intensity may occur to consume pile material.

BMP 7.8 – Cumulative Off-Site Watershed Effects: Maintain soil productivity, minimize erosion, and minimize ash, sediment, nutrients, and debris from entering water bodies.

- A cumulative watershed effects analysis was completed for the project. Project design standards, including resource protection measures, have been incorporated into the Proposed Action to minimize cumulative off-site watershed effects.

APPENDIX E

Project Activities Near or Within Riparian Reserves

APPENDIX E
Project Activities Near or Within Riparian Reserves

PROJECT ACTIVITIES NEAR BUT NOT WITHIN RIPARIAN RESERVES		
Unit	**Watershed**	**Proposed Activity with Notes**
M16	Shadow	Intermittent stream Riparian Reserve (RR) on northeast unit boundary. Unit boundary will be held outside of RR.
M19	Crawford	Very upper end of intermittent stream RR in lower portion of unit. Lower unit boundary will be set at the 4240 contour to exclude RR.
M21	Shadow	RR on southwest unit boundary. Unit boundary will be held outside of RR.
M24	Shadow	RR on south unit boundary. Unit boundary will be held outside of RR.
M51	Black Bear	Unit is adjacent to mapped active landslide (GEO). Field examination suggests slide is older and not currently showing evidence of movement. BMP 1.6 placed on list of resource protection measures for this unit. At layout, the TSA will be alerted by stand information record to look for slope movement.
M61	Shadow	Spring-fed headwater draws flank unit on both sides. These are not mapped as RRs but are clearly wet. Unit boundaries will exclude wet areas plus 50 foot buffer as stipulated via BMP 1.8 on list of resource protection measures.
M64	Crawford	Intermittent stream RR on south unit boundary. Unit boundary will be held outside of RR.
PROJECT ACTIVITIES WITHIN RIPARIAN RESERVES		
FRZ 2	Black Bear/ Eddy/ Indian/ Kanaka-Olsen/ Tanner-Jessups	GEO RRs just west of Black Bear Summit. Mapped active landslide (no evidence of recent movement based of field examination) and two small toe slope areas in this unit. Underburn prescription should have no impact. Mastication in RRs limited to Roadside treatment areas.
FRZ 4	Black Bear	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 5	Black Bear/ Eddy/ Crawford	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 6	Black Bear/ Matthews/ Crawford	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 7	Crawford/ Cody-Jennings/ Matthews/ Timber-French	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 9	Crawford	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). One small GEO RR mapped (active slide) and one small (1–2 acre) debris slide (not mapped) found during field survey. Both in NE1/4 of Sec 33. No mastication proposed on or near these sites.
FRZ 10	Crawford/ Gooey-Ketchum/ Shadow	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 11	Crawford/ Cody-Jennings/ Matthews/ Timber-French	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.

PROJECT ACTIVITIES WITHIN RIPARIAN RESERVES		
FRZ 12	Crawford/ Eddy/ Shadow/ Whites	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 13	Shadow/ Six Mile/ Whites	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. Two very small (<1 acre) GEO RRs mapped within this FRZ. Not found during field review. No mastication proposed in either type of RR. See list of resource protection measures (BMPs).
FRZ14	Gould EF/ Shadow/ Six Mile	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ15	Shadow/ Gould EF/ Gooey-Ketchum	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). No mastication proposed in RRs.
FRZ 16	Shadow	Small amount of inner gorge RR at south end of FRZ just above confluence of the two branches of Shadow Cr. Underburn proposed. Burn prescription will target canopy and ground cover retention. Small active slide (GEO) mapped just off the ridge and north of M21. No current movement evident. Underburn treatment unlikely to have destabilizing impact.). No mastication proposed in RRs.
FRZ 17	Eddy/ Whites	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). Small active landslides mapped just below 39N59 near Eddy Gulch Lookout. Even though slopes are gentle in this area, masticator will be kept of wet ground in favor of underburning.
FRZ 20	Upper North Russian/ Taylor	Minor intermittent stream RRs (very upper end) scattered throughout, mostly in areas proposed for underburning. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). Active landslides mapped along Sawyers Bar Road. No impact from underburning expected. Masticators will be kept off of actively unstable slopes.
RS3	Whites/Lower South Russian/ Sixmile/	Roadside treatments along 40N61 (Whites Gulch), 40N54 (Lower South Russian), and the bottom of the 39 road (Sixmile) will cross through many RRs. In the case of 40N54, the entire road for approx. 1 mile above Sawyers Bar road traverses the length of the RR. Most of these areas will receive hand thin/hand pile treatment. Limited mastication may be employed where conditions permit. Treatment will be conservative and will adhere to canopy and ground cover guidelines listed in resource protection measures (BMPs).
Rx1	Black Bear	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). Active landslide mapped in Argus Gulch. Field examination showed no evidence of recent movement. No impact expected from underburning.
Rx2	Black Bear/ Crawford	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs).
Rx3	Cody-Jennings/ Matthews	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). Nine small active landslides mapped but not field examined. Underburning prescription should retain live root networks and cover such that no impact is expected.
Rx4	Crawford	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). One small active landslide mapped but not field examined. Underburning prescription should retain live root networks and cover such that no impact is expected.

PROJECT ACTIVITIES WITHIN RIPARIAN RESERVES		
Rx5	Shadow	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). One active landslide (~20 ac) mapped but not field examined. No evidence of recent movement based on air photo interpretation. Underburning prescription should retain live root networks and cover such that no impact is expected.
Rx6	Shadow	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs).
Rx7	Gould EF/ Shadow/ Six Mile/ Gooey-Ketchum	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs).
Rx8	Lower North Russian/ Lower South Russian	Three intermittent and perennial stream RRs in this large prescribed underburn unit. A major RR runs along South Russian Creek. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). A debris basin (headwall scarp of old debris flow) is present but should pose no stability problems.
Rx9	Lower North Russian/ Upper North Russian/ Taylor	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). Three small active landslide are mapped but not field examined. Underburning prescription should retain live root networks and cover such that no impact is expected.
Rx11	Black Bear	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs).
Rx12	Eddy Gulch	Numerous intermittent and perennial stream RRs in this large prescribed underburn unit. No impact expected. Burn prescription will target canopy and ground cover retention. See list of resource protection measures (BMPs). Four active landslides are mapped in this unit. The largest was examined in the field and on air photos. The potential for further instability is relatively high. Underburning prescription should retain live root networks and cover such that no impact is expected.
Tanker Fill 1	South Russian	Tanker fill site will be located on 40N54 at milepost 0.2 and will draft from South Russian Creek. RR is associated with perennial stream.
Tanker Fill 2	North Russian	Tanker fill site on North Russian just off Sawyers Bar Road (1C01) at milepost 25.0 and near intersection of 41N19. RR is associated with perennial stream.
Tanker Fill 3	Crawford Creek	Tanker fill at crossing of County Road 1C02 (Callahan-Cecilville Road) and Crawford Creek in Cecilville. RR is associated with perennial stream.
Tanker Fill 4	Crawford Creek	Tanker fill from 39N23 at milepost 2.3. RR is associated with perennial stream.
Tanker Fill 5	Shadow Creek	Tanker fill site from 1C02 where it crosses Shadow Creek. RR is associated with perennial stream.
Tanker Fill 6	North Russian	Tanker fill site just off Sawyers Bar Road (1C01) at China Gulch Bridge (milepost 22.5). RR is associated with perennial stream.
Tanker Fill 7	Whites Gulch	Tanker fill site on Whites Gulch just above private property. RR is associated with perennial stream.
Tanker Fill 8	Taylor Creek (tributary to North Russian)	Tanker fill site on Taylor Creek just off 1C01. RR is associated with perennial stream.
Tanker Fill 9	Crawford Creek	Tanker fill site off switchback on 39N23 road. Drafts from West Fork of Crawford Creek. RR is associated with perennial stream.
Tanker Fill 10	Black Bear/Argus Gulch	Tanker fill site off 39 road and Cedar Springs. RR is mapped as active landslide although no evidence of current slope movement was present during field review.
Tanker Fill 13	Matthews Creek	Tanker fill site off County Road 1C02 at Matthews Creek. RR is associated with perennial stream.
Tanker Fill 14	Taylor Creek (tributary to South Fork Salmon)	Tanker fill site off 38N04 at crossing of Taylor Creek. RR is associated with perennial stream.

PROJECT ACTIVITIES WITHIN RIPARIAN RESERVES		
Tanker Fill 15	Music Creek	Tanker fill site off 40N54.4 at bridge crossing of Music Creek. RR is associated with perennial stream.
Tanker Fill 16	South Russian	Tanker fill site off 40N54 road where it crosses Johns Meadows Creek. RR is associated with perennial stream.
Tanker Fill 17	Jessups Gulch	Tanker fill site off the 40N46 road in upper Jessups Gulch. RR is associated with perennial stream.

APPENDIX F

Pacific Salmonid Life History, Status, and Biological Requirements

APPENDIX F
Pacific Salmonid Life History, Status, and Biological Requirements

The Salmon River basin provides approximately 175 miles of anadromous fish habitat (USDA Forest Service 2002b), distributed within the main stem, Wooley Creek, North Fork and South Fork Salmon rivers including for the following Evolutionarily Significant Units of Pacific salmonids: spring and fall run Upper Klamath-Trinity Rivers Chinook salmon (*Oncorhynchus tshawytscha*), summer and winter run Klamath Mountain Province steelhead (*O. mykiss*) and Southern Oregon/Northern California Coasts (SONCC) coho salmon (*O. kisutch*). The Salmon River spring-run Chinook salmon are one of the last and largest populations in the Klamath River system (USDA Forest Service 2002b). The LSR provides habitat for other species as well including sea run Pacific lamprey (*Lampetra tridentata*), green sturgeon (*Acipenser medirostris*), rainbow trout (*O. mykiss*), speckled dace (*Rhinichthys osculus*), Klamath small-scale sucker (*Catastomus rimiculus*), marbled sculpin (*Cottus klamathensis polyporus*) and Pacific brook lamprey (*Lampetra pacifica*).

The following Pacific salmonid Evolutionary Significant Units and their habitat in the Salmon River basin have special status under the Endangered Species Act (ESA) or are given special management consideration as Forest Service Sensitive Species:

Endangered:	None
Threatened:	SONCC coho salmon
Critical Habitat:	SONCC coho salmon
Proposed:	None
Sensitive:	Upper Klamath-Trinity Rivers Chinook salmon; Klamath Mountains Province steelhead
Essential Fish Habitat:	SONCC coho salmon; Upper Klamath-Trinity Chinook salmon

General life history information and biological requirements of SONCC coho salmon have been described in various documents (Hassler 1987; Weitkamp et al. 1995) as well as NOAA Fisheries' final rule listing SONCC coho salmon (May 6, 1997; 62 FR 24588). Adult coho salmon typically enter rivers between September and February. Spawning occurs from November to January (Hassler 1987), but occasionally as late as February or March (Weitkamp et al. 1995). Coho salmon eggs incubate for 35–50 days between November and March. Successful incubation depends on several factors including dissolved oxygen levels, temperature, substrate size, amount of fine sediment, and water velocity. Fry start emerging from the gravel two to three weeks after hatching and move into shallow areas with vegetative or other cover. As fry grow larger, they disperse up or downstream. In summer, coho salmon fry prefer pools or other slower velocity areas such as alcoves, with woody debris or overhanging vegetation. Juvenile coho salmon over-winter in slow water habitat with cover as well. Juveniles may rear in fresh water for up to 15 months then migrate to the ocean as smolts from March to June (Weitkamp et al. 1995). Coho salmon adults typically spend two years in the ocean before returning to their natal streams to spawn as three-year olds.

Chinook salmon mature between 2 and 6+ years of age (Myers et al. 1998). Fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991 in Myers et al. 1998). Post-emergent fry seek out shallow, nearshore areas with slow current and good cover, and begin feeding on small terrestrial and aquatic insects and aquatic crustaceans. The optimum temperature range for rearing Chinook salmon fry is 50°F to 55°F (Rich

1997) and for fingerlings is 55°F to 60°F (Rich 1997). In preparation for their entry into a saline environment, juvenile salmon undergo physiological transformations known as smoltification that adapt them for their transition to salt water. The optimal thermal range for Chinook during smoltification and seaward migration is 50°F to 55°F (Rich 1997). Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn (Myers et al. 1998). Chinook salmon addressed in this document exhibit an ocean-type life history, and smolts out migrate predominantly as subyearlings, generally during April through July. Chinook salmon spend between 2 and 5 years in the ocean (Bell 1986; Healey 1991), before returning to freshwater to spawn. Some Chinook salmon return from the ocean to spawn one or more years before full-sized adults return, and are referred to as jacks (males) and jills (females). Genetic analysis indicated that this Evolutionary Significant Units form a unique group that is quite distinctive compared to neighboring Evolutionary Significant Units. The majority of spring- and fall-run fish emigrate to the marine environment primarily as subyearlings, but have a significant proportion of yearling smolts. Recoveries of Coded Wire Tags indicate that both runs have a coastal distribution off the California and Oregon coasts.

Biologically, steelhead can be divided into two basic run-types, based on the state of sexual maturity at the time of river entry and duration of spawning migration (Burgner et al. 1992 in Busby et al. 1996). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (August 9, 1996, 61 FR 41542). South of Cape Blanco, Oregon, summer steelhead are known to occur in the Rogue, Smith, Klamath, Trinity, Mad, and Eel rivers, and in Redwood Creek (Busby et al. 1996).

Winter steelhead enter fresh water between November and April in the Pacific Northwest (Busby et al. 1996), migrate to spawning areas, and then spawn, generally in April and May (Barnhart 1986). Some adults, however, do not enter some coastal streams until spring, just before spawning. Steelhead require a minimum depth of 0.18 meters (7 inches) and a maximum velocity of 2.44 meters/second (8 feet/second) for active upstream migration (Smith 1973). Spawning and initial rearing of juvenile steelhead generally take place in small, moderate-gradient (generally 3%–5%) tributary streams (Nickelson et al. 1992). A minimum depth of 0.18 meters, water velocity of 0.30–0.91 meters/second (1–3 feet/second) (Thompson 1972), and clean substrate 0.6–10.2 cm (0.25–4 inches) (Nickelson et al. 1992) are required for spawning. Steelhead spawn in 3.9–9.4°C (39°F–49°F) water (Bell 1991). Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching, generally between February and June (Bell 1991). After two to three weeks, in late spring, and following yolk sac absorption, alevins emerge from the gravel and begin actively feeding. After emerging from the gravel, fry usually inhabit shallow water along banks of perennial streams. Fry occupy stream margins (Nickelson et al. 1992). Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992). Steelhead prefer water temperatures ranging from 12–15°C (54°F–59°F) (Reeves et al. 1987). Juveniles live in freshwater from one to four years (usually two years in the California Evolutionary Significant Units), then smolt and migrate to the ocean in March and April (Barnhart 1986). Winter steelhead populations generally smolt after two years in fresh water (Busby et al. 1996).

The Salmon River basin provides refugia habitat for these species and is the largest cold-water contribution to the Klamath River. The Salmon River lies almost entirely within the KNF and includes a system of five LSRs and six Key Watersheds. Thus, the Salmon River basin is a crucial

aquatic habitat linkage between Key Watersheds and LSRs on the KNF. Key Watersheds are part of a system of large refugia comprising watersheds that are critical for at-risk fish species and that provide high quality water and fish habitat. The Salmon River is also part of the federal Wild and Scenic Rivers system, based on its anadromous fisheries values.

Smaller 7th-field tributary streams within the LSR provide limited habitat for Pacific salmonids (see anadromous habitat map in Appendix D) due to natural barriers to migration, however, these streams are critical to anadromous salmonid habitat through their contribution of high quality water and watershed products that greatly influence the quality of refugia habitat downstream, including within the Salmon and Klamath rivers.

Terrain within the LSR is steep and dissected by sharp ridges and deep canyons. Most of the Eddy LSR lies above habitat accessible to anadromous salmonids. Chinook and coho salmon utilize habitat in the mainstem Salmon, North and South Fork of the Salmon River. The KNF anadromous fish data layer indicates that anadromous fish access the following streams near or within the LSR boundary: tributaries to the South Fork Scott River-Mill Creek and Etna Creek; tributaries to the Salmon River-North Russian Creek and one tributary (Cow Creek), South Russian Creek, Whites Gulch, Eddy Gulch; tributaries to the South Fork Salmon River-Black Bear Creek, East Fork of the South Fork Salmon River and two of its tributaries (Shadow Creek and West Shadow Creek).

APPENDIX G

Cumulative Watershed Effects Analysis

TABLE G-1. Comparison of results from the 2014 and 2021 CWE model runs to the current watersheds conditions in 2008 for Alternative B.

	USLE				ERA				GEO			
	Current	Current/ + Future	2014	2021	Current	Current + Future	2014	2021	Current	Current + Future	2014	2021
7th-field Watersheds												
Black Bear Creek	0.39		0.50	0.39	0.32		0.32	0.18	0.44		0.42	0.39
Cody-Jennings Creek	0.41		0.41	0.41	0.24		0.20	0.16	0.49		0.47	0.43
Crawford Creek	0.46		0.47	0.46	0.22		0.29	0.20	0.29		0.28	0.27
Eddy Gulch	1.05		1.06	1.05	0.39		0.41	0.39	0.79		0.78	0.78
Gooey-Ketchum Creek	0.26		0.26	0.26	0.12		0.12	0.11	0.50		0.50	0.50
Gould-East Fork South Fork Salmon River	0.35		0.35	0.40	0.16		0.17	0.21	0.45		0.45	0.45
Indian Creek	0.53		0.53	0.53	1.04		0.59	0.24	0.87		0.78	0.66
Kanaka-Olsen Creek	0.19		0.19	0.19	0.30		0.19	0.12	1.53		1.28	0.99
Lower North Russian Creek	0.24		0.25	0.24	0.17		0.18	0.17	0.47		0.47	0.47
Lower South Russian Creek	0.40		0.41	0.40	0.54		0.52	0.43	0.55		0.54	0.53
Matthews Creek	0.42		0.43	0.42	0.15		0.16	0.15	0.47		0.46	0.46
Robinson-Rattlesnake Creek	0.24		0.24	0.24	0.17		0.15	0.14	0.34		0.33	0.33
Shadow Creek	0.94		0.96	0.97	0.18		0.29	0.25	0.41		0.41	0.41
Sixmile Creek	0.52		0.52	0.52	0.12		0.12	0.13	0.36		0.36	0.36
Tanner-Jessups Creek	0.47		0.47	0.47	0.51		0.43	0.38	0.61		0.59	0.58
Taylor Creek	0.26		0.26	0.26	0.16		0.16	0.15	0.20		0.20	0.20
Timber-French Creek	0.24		0.24	0.24	0.14		0.12	0.10	0.31		0.31	0.30
Upper North Russian Creek	0.35		0.37	0.35	0.32		0.43	0.29	0.87		0.86	0.86
Whites Gulch	0.53		0.54	0.53	0.21		0.22	0.20	0.35		0.34	0.33
6th-field Watersheds												
Cecilville-Crawford Creek	0.37		0.35	0.34	0.20		0.20	0.15	0.36		0.35	0.33
Main East Fork South Fork Salmon River	0.38		0.38	0.39	0.13		0.16	0.15	0.29		0.29	0.29
North Russian Creek	0.28		0.29	0.28	0.21		0.24	0.19	0.46		0.46	0.45
Plummer-Black Bear Creek	0.23		0.26	0.24	0.25		0.21	0.13	0.41		0.38	0.35
South Russian Creek	0.21		0.21	0.21	0.20		0.18	0.14	0.27		0.26	0.25
Whites-Jackass Creek	0.55		0.55	0.55	0.26		0.25	0.23	0.49		0.48	0.47
5th-field Watersheds												
North Fork Salmon	0.19		0.18	0.18	0.23		0.18	0.14	0.55		0.49	0.42
South Fork Salmon	0.29		0.28	0.28	0.26		0.23	0.17	0.38		0.36	0.33

Table G-2 lists results of CWE analysis for watersheds in the LSR under Alternative B with the North Fork Roads Project. Alternative C was modeled separately but produced identical risk ratios because of the very small differences between the alternatives. The risk ratios reported for 2009 represent existing conditions plus foreseeable future actions (North Fork Salmon Road Project). The values reported for 2014 represent conditions at a point in time when all mechanical treatments will be complete. The values reported for 2021 represent the point in time when all treatments have been implemented.

TABLE G-2. CWE Model results for Alternative B combined with the North Forks road maintenance project.

	USLE Component			ERA Component			GEO Component		
Watershed	**2009**	**2014**	**2021**	**2009**	**2014**	**2021**	**2009**	**2014**	**2021**
7th-field Watersheds									
Black Bear Creek	0.39	0.50	0.39	0.32	0.32	0.18	0.44	0.42	0.39
Cody-Jennings Creek	0.41	0.41	0.41	0.24	0.20	0.16	0.49	0.47	0.43
Crawford Creek	0.46	0.47	0.46	0.22	0.29	0.20	0.29	0.28	0.27
Eddy Gulch	0.90	0.91	0.90	0.32	0.35	0.33	0.62	0.61	0.60
Gooey-Ketchum Creek	0.26	0.26	0.26	0.12	0.12	0.11	0.50	0.50	0.50
Gould-East Fork South Fork Salmon River	0.35	0.35	0.40	0.16	0.17	0.21	0.45	0.45	0.45
Indian Creek	0.53	0.53	0.53	1.04	0.59	0.24	0.87	0.78	0.66
Kanaka-Olsen Creek	0.15	0.15	0.15	0.27	0.17	0.10	1.43	1.18	0.90
Lower North Russian Creek	0.21	0.22	0.21	0.15	0.16	0.15	0.41	0.41	0.41
Lower South Russian Creek	0.30	0.31	0.30	0.42	0.40	0.31	0.36	0.35	0.34
Matthews Creek	0.42	0.43	0.42	0.15	0.16	0.15	0.47	0.46	0.46
Robinson-Rattlesnake Creek	0.21	0.21	0.21	0.16	0.13	0.13	0.32	0.31	0.31
Shadow Creek	0.93	0.96	0.97	0.18	0.29	0.25	0.41	0.41	0.41
Sixmile Creek	0.52	0.52	0.52	0.12	0.12	0.13	0.36	0.36	0.36
Tanner-Jessups Creek	0.34	0.34	0.34	0.46	0.37	0.32	0.41	0.39	0.38
Taylor Creek	0.23	0.23	0.23	0.14	0.14	0.13	0.15	0.15	0.15
Timber-French Creek	0.24	0.24	0.24	0.14	0.12	0.10	0.31	0.31	0.30
Upper North Russian Creek	0.27	0.30	0.27	0.26	0.37	0.23	0.60	0.59	0.58
Whites Gulch	0.28	0.29	0.28	0.13	0.14	0.12	0.19	0.17	0.17
6th-field Watersheds									
Cecilville-Crawford Creek	0.37	0.35	0.34	0.20	0.20	0.15	0.36	0.35	0.33
Main East Fork South Fork Salmon River–	0.38	0.38	0.39	0.13	0.16	0.15	0.29	0.29	0.29
North Russian Creek	0.24	0.25	0.24	0.18	0.21	0.16	0.35	0.35	0.34
Plummer-Black Bear Creek	0.23	0.26	0.24	0.25	0.21	0.13	0.41	0.38	0.35
South Russian Creek	0.15	0.16	0.15	0.16	0.14	0.10	0.16	0.15	0.14
Whites-Jackass	0.39	0.39	0.39	0.21	0.19	0.18	0.35	0.34	0.33
5th-field Watersheds									
North Fork Salmon River	0.15	0.13	0.13	0.20	0.16	0.11	0.48	0.41	0.34
South Fork Salmon River	0.29	0.28	0.28	0.26	0.23	0.17	0.38	0.36	0.33

Of all the 7th-field watersheds in the analysis, only Kanaka-Olsen has risk ratios over 1.0, and that represents the current condition (GEO=1.43). By 2014 the risk ratios are declining due to vegetative

recovery. Increases in risk ratios due to project activities are very small. As an example, Shadow Creek, which contains the largest area in mechanical treatments, increases from USLE=0.93 to 0.97 by project conclusion in 2021. All other watersheds have risk ratios that hold static or decline over the period of project implementation.

Under existing conditions, none of the 5th- or 6th-field watersheds are over threshold for surface soil erosion, mass-wasting, or equivalent roaded area, and project activities would not change that situation.

The modeled foreseeable future action (North Fork Salmon Roads Project) brought the Eddy Gulch 7th-field USLE risk ratio below threshold (USLE = 1.05 to 0.90) and lowered the Kanaka-Olsen 7th-field GEO risk ratio (GEO = 1.53 to 1.43).

Project activities would not result in any watershed going over threshold nor would they create any major increases in risk ratios. At project conclusion, most risk ratios are at levels equal to or less than those that currently exist. The action alternatives are expected to result in reduced risk ratios over the long term by reducing the risk of stand-replacing wildfire. There are no expected long-term cumulative effects on water quality or aquatic habitat or populations. It is expected that habitat quality will be improved in the long term as a result of project implementation.

Proposed thinning would occur across the landscape in FRZs and roadside treatment areas, including within Riparian Reserves, but would have insignificant short- and long-term adverse effects on fish and aquatic habitat due to the proposed methods (hand work and mastication), which will result in minimal soil disturbance or reduction in soil productivity.

No more than 10 percent of any 6th-field watershed would receive fuel hazard reduction treatments in any given year. Sediment and associated negative effects generated from fuel hazard reduction actions are expected to be insignificant in the short and long term because the activities are dispersed throughout the landscape, of low intensity, and will have resource protection measures and BMPs implemented that will minimize effects on soils and vegetation.

Riparian Reserve sediment filtration capacity will be maintained and existing habitat conditions (water quality and riparian function) will be maintained. The action alternatives would not add cumulatively to existing, ongoing, or future impacts.

APPENDIX H

Tiering Forms for the Eddy Gulch LSR Project

APPENDIX H
Tiering Forms for the Eddy Gulch LSR Fuels / Habitat Protection Project

FUELS HAZARD REDUCTION

KLAMATH NATIONAL FOREST

PROJECT INFORMATION SHEET – TIERING FORM

Salmon River and Scott River Ranger Districts

Project Name: Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project

Project Contact Person: Alice Berg

Project Implementation Dates:

The following sequence of treatments would be used to implement the Eddy Gulch LSR Project.

1. Complete FRZs (roadside treatments) during the first four years.

   Construct FRZs in the following order:

   FRZs 2, 3, 12, 13
   FRZs 14, 15
   FRZs 4, 5, 6, 9
   FRZs 7, 10, 11
   FRZs 16, 17, 20

2. Complete FRZs (mastication and prescribed burns) during the first six years following the order above. Some prescribed burning may occur in Rx Units adjacent to FRZs to establish control points.

3. Complete Rx Units during the first 11 years. The approximate order would be

   - Northwest and western portion of Rx Unit 1 and Rx Unit 12
   - Rx Unit 3 and Rx Unit 8
   - East side Black Bear Ranch Road in Rx Unit 1 and Rx Unit 2
   - West portion of Rx Unit 4 and Rx Unit 11
   - East portion of Rx Unit 4 and Rx Unit 9s
   - Remainder of Rx Unit 1 and Rx Unit 5
   - Rx Unit 6 and Rx Unit 7

Within occupied or unsurveyed suitable habitat, no more than 50 percent of the nesting, roosting, or foraging northern spotted owl habitat would be burned or mechanically treated in a single year in any one 7th-field watershed up to 3,500 acres in size. If the 7th-field watershed is more than

3,500 acres, apply the design criteria at the 8th-field watershed scale or in some other manner that meets the intent of the design feature.

To minimize the potential for cumulative adverse affects when underburning, no more than 10 percent of a 6th-field watershed will be burned in any one year.

Legal Location(s) of Project: (All Mount Diablo Meridian):

T38N, R11W, Sections 2-5, 8-10, and 17-19;
T38N, R12W, Sections 1-3, 9-16, and 22-24;
T39N, R10W, Sections 2-10, 15-21, and 29-31;
T39N, R11W, Sections 1-18, 20-29, and 32-36;
T39N, R12W, Sections 11-14, 23-25, and 36;
T40N, R10W, Sections 3-5, 8-11, and 13-35;
T40N, R11W, Sections 24-27 and 34-36;
T41N, R10W, Sections 2-5, 8-17, 20-24, 26-29, and 31-34;
T42N, R10W, Sections 28-29 and 32-35.

The Eddy Gulch LSR includes 60,331 acres of KNF lands and 2,323 acres of private lands. No actions are proposed on private lands.

Name of 5th-field watersheds: North Fork Salmon River; South Fork Salmon River

Name and size of 6th-field subwatersheds:

Watershed	Acres
Main East Fork South Fork Salmon	31,389
Cecilville-Crawford Creek	25,453
Plummer-Black Bear Creek	33,938
North Russian Creek	11,642
South Russian Creek	11,826
Whites-Jackass Creek	29,439

Size of Project: *Eddy Gulch LSR*. 61,900 acres; *Assessment Area*—the 37,239-acre portion of the Eddy Gulch LSR west of Etna Summit where various treatments are proposed. All roadless areas that occur in the LSR were excluded from planning efforts and are therefore not part of the Assessment Area.

Aquatics ESA Determination: NLAA.

Aquatic Period of Operation (APOO) needed? X (Yes) ____ (No)

If yes, state for which species and dates of APOO: SONCC coho salmon

Wet Weather Operation Standards (WWOS) (USDA Forest Service 2002a) will be used to guide operations, especially hauling, during periods of wet weather. Earth scientists will examine field conditions to determine when the soil and roads have dried out enough to enable operations to resume without risk of watershed impacts. The earth scientists will make recommendations to the Timber Sale Administrator who will provide direction to the Timber Sale Contractor as to when operations may resume to ensure that BMPs will be met and adverse impacts will be avoided. The KNF LRMP Soil Cover Guidelines pages 4-21 (USDA Forest Service 1995a) will be met to minimize soil compaction and erosion during and after timber harvest within each stand and underburned areas.

Actual Operating Period:

Project activities are scheduled to occur between April 15 and October 15. This period may be extended on either end of the stated seasonal range based on occurrence of all of the following criteria: (1) a long-term dry-weather forecast, (2) the ability to winterize activities at the end of the day, (3) acceptance of recommendations from the district fisheries biologist and/or hydrologist (after meeting the first two criteria), and (4) authorization by the District Ranger (after meeting the first three criteria). The WWOS will be followed whenever activities occur outside of the normal operating season (USDA Forest Service 2002a). All landings, skid trail construction, road closure, and road re-conditioning will be conducted during the appropriate periods of weather and soil moisture to ensure BMP attainment and the avoidance of adverse effects on listed species (USDA Region 5 Soil Quality Handbook [USDA Forest Service 1995b] and BMP 5.6). Favorable forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur.

Burning would need to occur during weather conditions that will allow crews to meet objectives on the ground, including safety. Thus, this Project Element may occur outside of April 15–October 15.

Within Designated Critical Habitat?	**X**	
	Yes	**No**

Distance to suspected Anadromous Habitat	**Distance to known coho habitat**	**Distance to known steelhead habitat**
Within	Within	Within

Project Design Standard Compliance Documentation attached with each PDS addressed?	**X** Yes	No
Checklist of Indicators attached?	**X** Yes	No
Map attached?	**X** Yes	No

Within Riparian Reserve?	Yes: **X**	No
If Yes, Type of RR: **See Appendix H**		

Intermittent Channel	Yes: **X**	No
Perennial Channel	Yes:	No
Active Slide	Yes:	No
Toe Zone	Yes:	No
Inner Gorge – Unconsolidated	Yes:	No
Inner Gorge – Granitic	Yes:	No
Inner Gorge – Non-Granitic	Yes:	No

Description of Project:

Project Summary

The Project would include 25,969 acres of treatments to increase resistance and resilience to wildfires and improve emergency access in the Eddy Gulch LSR Assessment Area. Three primary treatment types were identified in the Eddy Gulch LSR: the Fuel Reduction Zones (FRZs), prescribed burn units (Rx Units), and Roadside (RS) treatments along emergency access routes, which are described below.

- **FRZs**—strategically located on ridgetops to increase resistance to the spread of wildfires. They are wide enough to capture most short-range spot fires; surface, ladder, and crown fuels are reduced to change crown fires to surface fires within the treated areas. 16 FRZs would be constructed totaling 8,291 acres. The 8,291 acres includes 931 acres in 42 M Units (thinning units) and 7,360 acres in fuel reduction areas (outside the M Units) to reduce surface and ladder fuels.

- **Rx Units**—a series of landscape-level (250–4,300 acres) treatments designed to increase resilience to wildfires by reducing surface and ladder fuels. Most of these treatments would occur on south-facing aspects where fuels dry faster, and treatments would support the role of the FRZs. Approximately 17,524 acres of Rx Units to increase resiliency to wildfires.

- **Roadside (RS) Treatments**—along 60 miles of emergency access routes identified in the Salmon River CWPP and designed to facilitate emergency access for residents to evacuate and for suppression forces to safely enter the LSR in the event of a wildfire. The project proposes to treat 44 miles of emergency access routes in FRZs and Rx Units (treatments would be similar to the FRZ or Rx Unit) and 16 miles (154 acres) of RS treatments outside of FRZs and Rx Units—a total of 60 miles of treatments along emergency access routes.

Under both action alternatives, a “Designation by Description” prescription with variable spacing would be used to retain the largest trees generally within 14–28 feet of the next adjacent largest conifer tree. Tree removal would thin from below, removing trees 8–28 inches diameter at breast height (dbh). No trees larger than 20 inches dbh would be removed in M Unit 8, M Unit 24, M Unit 31, M Unit 43, and M Unit 51 to retain large trees in northern spotted owl habitat. Variable-density thinning from below would take place with modifications for the stand’s topographic aspect, slope position, species composition, and relationship to other key habitat features (refer to DEIR Table G-1, General Thinning Prescriptions for Trees Greater Than 9 Inches DBH). Trees in the smaller size classes (3 to 20 inches in diameter) would be removed. Tree retention would favor sugar pine, ponderosa pine / Jeffrey pine, Douglas-fir, incense-cedar, and black oak—in that order at lower elevations, and white fir / red fir at higher elevations.

Variable Density Thinning – (trees over 9 inches dbh; see DEIR Table G-1 for thinning descriptions).

Alternative B (Proposed Action) – 931 acres
Alternative C (No New Temporary Roads) – 832 acres

The following yarding systems will be used:

- Tractor
- Tractor Endlining
- Cable

Requirements for resource protection: Resource protection measures are listed in Appendix D.

By signature, I certify that the above Project meets the criteria listed in the Description of Proposed Action section of the "PRE-COMMERCIAL THIN AND RELEASE AND FUEL HAZARD REDUCTION ON THE KLAMATH NATIONAL FOREST" Biological Assessment (dated July 19, 2001) as documented in the Tier Form and Project Design Standard Documentation for fish species and their critical habitat listed under the Endangered Species Act and as listed as Region 5 Sensitive Species.

/s/ Alice Berg	April 16, 2009
Alice Berg Fisheries Biologist	Date

Pre-Commercial Thin and Release / Fuels Hazard Reduction
Klamath National Forest

Project Design Standards Compliance Documentation

Salmon River and Scott River Ranger Districts

Project Name: Eddy Gulch LSR Project

Project Design Standard	Met	N/A	Not Met & Why
1. Diameter at Breast Height (dbh) <10”	X		
2. a. Masticator on ≤45% slopes	X		
b. Soil Moisture ≤18%	X		
c. Not within 50 ft. of any perennial/intermittent <1 ft. wetted width; not within 100 ft. of any perennial >1 ft. wetted width	X		
d. Not operated within break in slope of inner gorge	X		
e. Channel Crossings designated and/or approved by fish bio or hydrologist		X	
3. Fuels treatment within 30 ft. of streams <1 ft. wetted width = lop and scatter when one of the following exist:	X		
a. Units not? located on granitic soils or other highly erodible soils	X		
b. Sideslopes entering channels are >35%	X		
c. Soil cover estimates within 15 ft. of streams are <50%	X		
4. In areas that do not meet 3a, b, or c, handpiling and burning can occur within 15–30 ft. of streams as follows:	X		
a. COR or inspector demonstrates that est. soil cover >50% within the adjacent 15-foot no-handpile buffer	X		
b. Handpiles are not stacked above one another	X		
c. Handpiles ≤6 ft. diameter	X		
5. When underburning, handlines in RRs will not be closer than 25 ft. of watercourse	X		
6. Handlines will be mitigated immediately after burning	X		
7. When underburning in AWWCs, additional review by hydrologist, soil scientist, and/or geologist has occurred	X		
8. No >10% of a 5^{th}- or 6^{th}-field watershed will be burned in any one year	X		
9. Prescribed fire will mimic low intensity backing fire, except where piles are burned	X		

Project Name: Eddy Gulch LSR Project			
Project Design Standard	**Met**	**N/A**	**Not Met & Why**
10. Ignition of prescribed fire in hydrologically RRs only to minimize potential for roll out into a RR thereby reducing potential for moderate to high intensity burns. Approved by district fish bio	X		
11. When underburning, at least 90% of LWD will be left on site, both standing and on ground	X		
12. Field personnel and equipment will not enter anadromous reaches during the period of Oct. 15 – June 15	X		
13. For PCT & release units within RRs, and where currently > 80% shade exists, at least 80% will be maintained	X		
14. For PCT & release units with larger conifers, any trees felled within perennial stream channels will be left		X	
15. Units with geologic RRs have geologist or other earth scientist review	X		
16. BMPs and WWOs will be implemented	X		
17. Units of predominately Ponderosa Pine will not be treated until after mid-July	X		
18. No new landing or road construction	X		Burning, mastication and hand work (actions that tier) do not require temp road construction; temp roads are assoc. with mechanical units - refer to temp. roads discussion determined to be a no effect

Tiering Form for Facility Maintenance and Road Decommissioning and Stormproofing Actions on the Klamath National Forest

Eddy Late Seral Reserve Habitat Restoration and Fuels Reduction Project

Ranger District: Salmon River and Scott River Ranger Districts Date Prepared: April 16, 2009

Project Name: **Eddy Late-Successional Reserve Fuels / Habitat Protection Project** Project Contact: Julie Perrochet, Project Coordinator

Name of 5th Field Watershed(s): North Fork Salmon River
South Fork Salmon River
South Fork Scott-French

Name of stream(s) and 7th field watershed(s) where **instream** activities will occur in occupied CH or EFH:
Stream Name: N/A Watershed Name: N/A
Stream Name:
Stream Name: Watershed Name:
Stream Name:

Does project occur within 300 feet of potentially occupied CH or EFH?	Coho (CH)	Chinook (EFH)	Steelhead
	Yes, water drafting and underburning	Yes, water drafting and underburning	Yes, waterdrafting and underburning

Distance to known steelhead habitat*: 0 miles

Distance to known occupied CH or EFH*: CH: 0 miles EFH: 0 miles

Distance to known unoccupied CH or EFH*: CH: 0 miles EFH: 0 miles

* Distance information obtained from Calfish.org website, the repository for the most current fish species distribution information

Legal Location of Project: The legal description of the Eddy Gulch LSR includes the following (all Mount Diablo Meridian):

T38N, R11W, Sections 2-5, 8-10, and 17-19;
T38N, R12W, Sections 1-3, 9-16, and 22-24;
T39N, R10W, Sections 2-10, 15-21, and 29-31
T39N, R11W, Sections 1-18, 20-29, and 32-36;
T39N, R12W, Sections 11-14, 23-25, and 36;
T40N, R10W, Sections 3-5, 8-11, and 13-35;
T40N, R11W, Sections 24-27 and 34-36;
T41N, R10W, Sections 2-5, 8-17, 20-24, 26-29, and 31-34;
T42N, R10W, Sections 28-29 and 32-35

Proposed Project Implementation Dates (year(s)):	Fuel Reduction Zone treatment: 2010–2015; Prescribed Burn treatment: 2010–2020	Normal Operating Season (NOS): April 15–October 15; This NOS may be extended on either end of the stated seasonal range based on occurrence of all of the following criteria: (1) a long-term dry-weather forecast, (2) the ability to winterize activities at the end of the day, (3) acceptance of recommendations from the district fisheries biologist and/or hydrologist (after meeting the first two criteria), and (4) authorization by the District Ranger (after meeting the first three criteria). Wet Weather Operation Standards will be followed whenever activities occur outside of the NOS.
Size of Project:	Project Treatment Area- *25*,969-acre portion of the Eddy Gulch LSR, which includes: haul route maintenance on 2E001, 40N61, FS39, 39N20, and 39N23; hazard tree removal, temporary road work, landings work, and water drafting.	

Project occurs in: See comment below the following table.

Intermittent Channel		Inner Gorge – Unconsolidated	
Perennial Channel		Inner Gorge – Granitic	
Active Slide		Inner Gorge – Non-Granitic	
Toe Zone			

The road system on which this project occurs bisects many different portions of the landscape and crosses over many active stream channels that are either perennial or intermittent. The project area cuts across a variety land types including active slides, toe zones of dormant landslides, steep granitic lands and inner gorges. Areas of concern have been identified by forest geologist Juan de la Fuente and the contract geologist and site specific mitigation measures will be developed as needed.

ESA Determination: MANLAA

Estimated Amount of Take (individual coho salmon): 0

Estimated Amount of occupied CH and/or EFH) dewatered: 0 miles

Estimated Duration of dewatered CH or EFH (# days): 0 days

Project Design Standard Compliance Documentation attached with each PDS addressed?	**X** Yes	____ No
Checklist of Indicators attached?	**X** Yes	____ No
Map attached?	**X** Yes	____ No

Description of Project:

The project includes 25,969 acres of treatments to increase resistance and resilience to wildfires and improve emergency access in the Eddy Gulch LSR Project Assessment Area. Table H-1 below lists 5th- and 7th-field subwatersheds that may be affected by the project.

TABLE H-1. 5th- and 7th-field subwatersheds potentially affected by the project, and their Hydrologic Unit Codes.

Watershed	HUC
North Fork Salmon River (5th field)	1801021002
South Fork Salmon River (5th field)	1801021001
Black Bear Creek	18010210010604
Cody-Jennings Creek	18010210010602
Crawford Creek	18010210010502
Eddy Gulch	18010210020603
Gooey-Ketchum Creek	18010210010307
Gould-East Fork South Fork Salmon River	18010210010305
Indian Creek Creek	18010210010605
Kanaka-Olsen Creek	18010210020801
Lower North Russian Creek	18010210020403
Lower South Russian Creek	18010210020503
Matthews Creek	18010210010603
Robinson-Rattlesnake Creek	18010210020602
Shadow Creek	18010210010306
Sixmile Creek	18010210010304
Tanner-Jessups Creek	18010210020604
Taylor Creek	18010210020402
Timber-French Creek	18010210010504
Upper North Russian Creek	18010210020401
Whites Gulch	18010210020601
Upper Etna Creek	18010208020602

Project treatments tiering to this *Facility Maintenance and Watershed Restoration Programmatic Biological Assessment* include the following:

Haul Routes: There are five basic routes to haul products out of the Assessment Area:

- 2E001 (Sawyers Bar). The route connects to County Road 1C01 with haul to Etna and Highway 3 to Yreka.

- 40N61 (Whites Gulch Road). The route connects to County Road 1C01 with haul to Etna and Highway 3 to Yreka.

- FS39. The route connects with County Road 1C02 with haul to Callahan and Highway 3 to Yreka.

- 39N20. The route connects with County Road 1C02 at Shadow Creek with haul to Callahan and Highway 3 to Yreka.

- 39N23. The route connects with County Road 1C02 at Cecilville with haul to Callahan and Highway 3 to Yreka.

All of these routes have been used in the past and are suitable for use with this project. Prior to and during haul, a portion of the road maintenance needs will be dust abatement. Project road maintenance will be consistent with road maintenance activities addressed by the NMFS (2004b) letter of concurrence for *Facility Maintenance and Watershed Restoration,* and associated *Facility Maintenance and Watershed Restoration* (FMWR) BA/BE (USDA Forest Service 2004), and Level II elevation that resulted in modification of the tier forms (USDA Forest Service-NMFS 2005).

Hazard Tree Removal: Hazard trees (trees posing a hazard to logging or hauling operations) will be felled and may be removed along log haul routes, to meet OSHA requirements and implementation will follow the 2005 Klamath National Forest Hazard Tree Policy—Safety Provisions on National Forest System Roads (USDA Forest Service 2005a). A tree is considered a hazard if all or a portion of the tree has a high potential to fall or roll onto a roadway or facility and cause personal injury or property damage. Distance to trees on the uphill side of a roadway or facility may exceed one tree height if they are likely to roll or slide onto the roadway, site, or facility (that is, there are insufficient barriers to prevent trees from reaching the roadway, trail, or facility). The hazard tree identification process will be used for trees along road systems.

Hazard trees that require felling within Riparian Reserves are routinely left on site because these trees may be needed to maintain and/or restore large woody debris function and abundance within the reserves. Naturally fallen or felled hazard trees may be removed from Riparian Reserves under the following circumstances:

- Trees must be removed to provide safe road passage or campground access, OR

- The trees would pose a substantial risk to the forest road drainage system integrity, AND

- A fisheries biologist determines through site inspection and written documentation that removal of individual hazard trees within interim Riparian Reserves is not inconsistent with the Aquatic Conservation Strategy Objectives. Removal would only be appropriate when a local area survey of the affected Riparian Reserve clearly indicates that the functioning level with respect to large wood will not change from current levels after individual tree removal.

Temporary Road Construction: No new *authorized* roads will be constructed. Temporary roads are proposed to facilitate access to treatment units.

- Approximately 1.03 miles (5,433 feet) of new temporary roads would be used to access all or portions of seven M Units. These new temporary roads would be closed (ripped and mulched, as needed) following thinning.

- Approximately 0.98 mile (5,177 feet) of former logging access routes would be re-opened (vegetation removed and bladed) to access all or portions of five M Units. These routes would be water-barred, vegetated, and closed immediately after thinning is completed.
- Five spurs, each less than 100 feet long, would be bladed for tractor or cable yarding operations in two M Units.

TABLE H-2. Proposed new temporary roads, former logging access routes, and operational spurs for the Eddy Gulch LSR Project.

Location	Length (feet)	Access For	Description
Intersection 39N53	1,577	M Unit 15 (Cable)	New Temporary Road
Intersection 39N20	550	M Unit 17	New Temporary Road
Intersection 39N73	1,074	M Unit 21 (Cable)	New Temporary Road
Intersection FS39	605	M Unit 24	New Temporary Road
Intersection 39N58B	617	M Unit 36	New Temporary Road
Intersection 39N53A	560	M Unit 37	New Temporary Road
Intersection 39N37A	450	M Unit 75	New Temporary Road
Intersection 39N23	1,123	M Unit 9	Former Logging Access Route
Intersection 39N53	1,381	M Unit 15 (Tractor)	Former Logging Access Route
Intersection 39N58	519	M Unit 25	Former Logging Access Route
Intersection 39N04 – Lafayette Pt.	2,154	M Units 43 and 8	Former Logging Access Route
Intersection FS39A	240	M Unit 23	Four Logging Spurs at 60 Feet Each–Operations
Intersection 39N04A	100	M Unit 39	Short Logging Spur–Operations

Road Closure: All 1.03 miles of new temporary roads constructed under Alternative B would be closed (ripped and mulched, as needed) following thinning and fuel treatments. The re-opened (approximately 0.98 mile or 5,177 feet) former logging access routes would be water-barred, vegetated, and closed immediately after thinning is completed. The new temporary roads proposed for use and closure do not have stream crossings.

Road closures will be done in a manner consistent with the *Facility Maintenance and Watershed Restoration* Letter of Concurrence (USDC NMFS 2004b) and associated 2004 programmatic BA for *Facility Maintenance and Watershed Restoration on the Klamath National Forest* (USDA Forest Service 2004b).

Water Drafting

All project water drafting will follow NOAA-Fisheries Water Drafting Specifications (USDC NMFS 2001). Ten water drafting sites that may be used during the project will be located in anadromous fish-bearing reaches as follows (see Figure C-2 in Appendix C): Crawford Creek (1), Mathews Creek (1), North Fork Salmon River (1), North Russian Creek (3), Shadow Creek (1), South Russian Creek (1), South Fork Salmon River (1) and Whites Gulch (1).

Landings

Existing wide spots along roads and forest openings will be used for project landings wherever possible. The number of these areas is not available. All landings are existing and none are within Riparian Reserves.

Additional requirements for resource protection not listed in the Proposed Action PDSs: N/A

Change in Baseline conditions per 7th- and 5th-field watersheds with Pacific salmonids:

TABLE H-3. Cumulative watershed effects model results for Eddy Gulch LSR Project 5th-, 6th-, and 7th-field subwatersheds.

	USLE Component			ERA Component			GEO Component		
Watershed	**2009**	**2014**	**2021**	**2009**	**2014**	**2021**	**2009**	**2014**	**2021**
7th-Field Watersheds									
Black Bear Creek	0.39	0.50	0.39	0.32	0.32	0.18	0.44	0.42	0.39
Cody-Jennings Creek	0.41	0.41	0.41	0.24	0.20	0.16	0.49	0.47	0.43
Crawford Creek	0.46	0.47	0.46	0.22	0.29	0.20	0.29	0.28	0.27
Eddy Gulch	0.90	0.91	0.90	0.32	0.35	0.33	0.62	0.61	0.60
Gooey-Ketchum Creek	0.26	0.26	0.26	0.12	0.12	0.11	0.50	0.50	0.50
Gould-East Fork South Fork Salmon River	0.35	0.35	0.40	0.16	0.17	0.21	0.45	0.45	0.45
Indian Creek	0.53	0.53	0.53	1.04	0.59	0.24	0.87	0.78	0.66
Kanaka-Olsen	0.15	0.15	0.15	0.27	0.17	0.10	1.43	1.18	0.90
Lower North Russian Creek	0.21	0.22	0.21	0.15	0.16	0.15	0.41	0.41	0.41
Lower South Russian Creek	0.30	0.31	0.30	0.42	0.40	0.31	0.36	0.35	0.34
Matthews Creek	0.42	0.43	0.42	0.15	0.16	0.15	0.47	0.46	0.46
Robinson-Rattlesnake Creek	0.21	0.21	0.21	0.16	0.13	0.13	0.32	0.31	0.31
Shadow Creek	0.93	0.96	0.97	0.18	0.29	0.25	0.41	0.41	0.41
Sixmile Creek	0.52	0.52	0.52	0.12	0.12	0.13	0.36	0.36	0.36
Tanner-Jessups Creek	0.34	0.34	0.34	0.46	0.37	0.32	0.41	0.39	0.38
Taylor Creek	0.23	0.23	0.23	0.14	0.14	0.13	0.15	0.15	0.15
Timber-French Creek	0.24	0.24	0.24	0.14	0.12	0.10	0.31	0.31	0.30
Upper North Russian Creek	0.27	0.30	0.27	0.26	0.37	0.23	0.60	0.59	0.58
Whites Gulch	0.28	0.29	0.28	0.13	0.14	0.12	0.19	0.17	0.17
6th-Field Watersheds									
Cecilville-Crawford Creek	0.37	0.35	0.34	0.20	0.20	0.15	0.36	0.35	0.33
Main East Fork South Fork Salmon River	0.38	0.38	0.39	0.13	0.16	0.15	0.29	0.29	0.29
North Russian Creek	0.24	0.25	0.24	0.18	0.21	0.16	0.35	0.35	0.34
Plummer-Black Bear Creek	0.23	0.26	0.24	0.25	0.21	0.13	0.41	0.38	0.35
South Russian Creek	0.15	0.16	0.15	0.16	0.14	0.10	0.16	0.15	0.14
Whites-Jackass Creek	0.39	0.39	0.39	0.21	0.19	0.18	0.35	0.34	0.33
5th-Field Watersheds									
North Fork Salmon River	0.15	0.13	0.13	0.20	0.16	0.11	0.48	0.41	0.34
South Fork Salmon River	0.29	0.28	0.28	0.26	0.23	0.17	0.38	0.36	0.33

Project activities included in the 2004 programmatic BA for *Facility Maintenance and Watershed Restoration on the Klamath National Forest* tier form do not adversely affect modeled cumulative watershed effects results.

Under existing conditions, none of the 5th- or 6th-field watersheds are over threshold for surface soil erosion, mass-wasting, or equivalent roaded area, and project activities will not change that situation.

The modeled future foreseeable action (North Fork Salmon Roads Project) brought the Eddy Gulch 7th-field USLE risk ratio below threshold (USLE = 1.05 to 0.90) and lowered the Kanaka-Olsen 7th-field GEO risk ratio (GEO = 1.53 to 1.43).

Project activities would not result in any watershed going over threshold nor would they create any major increases in risk ratios. At project conclusion, most risk ratios would be at levels equal to or less than those that currently exist. The project is expected to result in reduced risk ratios over the long term by reducing the risk of stand-replacing wildfire. There are no expected long-term cumulative effects to water quality or aquatic habitat or populations. It is expected that habitat quality will be improved in the long term as a result of implementation of the project.

By signature, I certify that the above project meets the criteria listed in the Description of Proposed Action section of the programmatic BA for "Facilities Maintenance and Watershed Restoration on the Klamath National Forest" (dated July 23, 2004) as documented in this Tiering Form and documentation of Project Design Standard compliance for fish species and their habitat (including CH) listed under the Endangered Species Act, listed under the Magnuson-Steven Act, and as designated as Region 5 Sensitive Species.

April 16, 2009

Alice Berg
Fisheries Biologist

Date

Facility Maintenance and
Road Decommissioning and Stormproofing Actions
on the Klamath National Forest

Project Design Standards Compliance Documentation

Ranger District:	Salmon River and Scott River Ranger Districts	Date Prepared:	April 16, 2009
Project Name:	**Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project**	Project Contact:	Julie Perrochet, Project Coordinator

Project Name: Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project

Project Design Standard	Met	N/A	Not Met & Why
1. RRs are identified, S&G's met	X		
2. BMPs as described	X		
3. Timing Per PDS#3: APOO or Define for your project	X		
4. Rocking, straw mulch, hay bales, or waddles will be used as necessary, where the possibility of water spill or overflow would otherwise result in sediment being moved toward the creek	X		
5. Dispose of unsuitable slide and waste material in stable, non-floodplain sites. Suitable slide, fill and waste material may be used to restore natural or near-natural contours, as approved by geotechnical engineer or other qualified personnel		X	
6. No fueling/refueling of mechanical equipment such as chainsaws will occur within 100 feet of any flowing watercourse or intermittent drainage. Fueling and servicing of vehicles used for proposed activities will be done outside of RRs in accordance with BMP 2-12;	X		
7. Any hazardous spills will be immediately cleaned up and reported to the USFS. In the occurrence of a spill, NOAA Fisheries will be notified for emergency consultation. Report any chemical spills to the District Ranger and Fisheries biologist immediately and re-initiate ESA consultation if warranted;	X		
8. Clean equipment to remove noxious weeds;	X		
8 a. Clean equipment of petroleum residues prior to working within a channel;		X	

Project Name: Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project

Project Design Standard	Met	N/A	Not Met & Why
9. Minimize disturbance of existing vegetation within the road clearing limits, at stream crossings, and approved disposal sites to the extent necessary to restore the hydrologic function of the subject road;	X		
10. During culvert cleaning, if equipment leaves the roadbed, the site will be recontoured to avoid creating or concentrating erosion. See also BMP 2.15;		X	
11. Stream Simulation – It is recommended that the USDA San Dimas Technology and Development Center guidelines for Designing for Aquatic Species Passage at Road-Stream Crossings be used to design fish passage restoration and culvert replacement activities. The stream simulations are intended to mimic the natural stream processes within a culvert or under a bridge;		X	
12. Replacement of stream crossings will be designed to accommodate at least a 100-year flood, including associated bedload and debris;		X	
13. Replacement of stream crossings will be designed to provide and maintain fish passage on all existing and potential fish bearing streams;		X	
14. Isolate construction sites from stream flow before removing a culvert and performing work inside the stream channel. The work site may be completely dewatered or in some circumstances, the stream may be rerouted within the channel;		X	
15. When activities are proposed within a stream channel that may cause significant disturbance to coho salmon, a biologist will snorkel the work area to look for individuals prior to dewatering to encourage them to move out of the area and to estimate the number of individual coho salmon potentially affected;		X	

Project Name: Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project

Project Design Standard	Met	N/A	Not Met & Why
16. Activities using heavy equipment (such as culvert replacement, drainage ditch maintenance with a backhoe, water-drafting site maintenance, spawning channel maintenance) that occur in the active stream channel within 300 feet of habitat potentially occupied by coho salmon are limited to 2 in the same 7th field watershed in any one year. The determination of occupancy is based on field review, survey data, known presence of a barrier, or California Department of Fish and Game data. http://ice.ucdavis.edu/aquadiv/fishcovs/fishmaps.html)		X	
17. Spawning channel operation and maintenance: If either spawning channel is accidentally dewatered or otherwise operated in a manner that results in significant negative effects to individual coho salmon, NOAA-Fisheries staff will be contacted immediately to estimate Incidental Take		X	
18. Hazard Tree guidelines (NOAA, 1997, USDA 2001): A tree is considered a hazard if all or a portion of the tree has a high potential to fall or roll onto a roadway or facility and cause personal injury or property damage. Distance to trees on the uphill side may exceed one tree height if they are likely to roll or slide onto the roadway, site, or facility (i.e., there are insufficient barriers to prevent trees from reaching the roadway, trail or facility). The hazard tree identification process will be used for trees along road systems, within campgrounds, administrative sites, and other high use recreation areas.	X		
18a. Hazard trees that have fallen or are felled within RRs will generally be left on site, as these trees may be needed to maintain and restore coarse woody debris levels and function within these areas.	X		

Project Name: Eddy Gulch Late-Successional Reserve Fuels / Habitat Protection Project

Project Design Standard	Met	N/A	Not Met & Why
18b. Fallen or felled hazard trees may be removed from RRs if • Trees must be removed to provide safe road passage or campground access and function; OR • Those trees would pose a substantial risk to the forest road drainage system integrity; AND • A fisheries biologist determines through site inspection and written document that removal of individual hazard trees within RRs is consistent with the Aquatic Conservation Strategy Objectives.	X		
19. Proposed activities will not reduce stream shade/canopy below 80%. Exception: Localized reduction canopy cover below 80% may occur, if field review by fisheries biologist determines that water temperature will not be adversely affected.	X		
20. When water is drafted from Pacific salmonids bearing stream reaches follow NOAA Fisheries *Water Drafting Specifications*. See PDS #20.	X		
21. Trail maintenance and camping: Will be done with non-mechanized equipment within Wilderness; chainsaws and other mechanized equipment may be used outside of Wilderness.		X	
22. Trail re-routing in 7th field watersheds that contain anadromous fish will be limited to 2 miles per year on the Forest to avoid cause adverse effects to Pacific salmonids or their habitat.		X	
23. No new trail construction is consulted on within this programmatic analysis.		X	
24. Rock (borrow) pits in RRs will be avoided where possible. If rock pits are located in an RR, an earth scientist or fish biologist will verify through a site review that the use of the rock pit will not cause sediment delivery to anadromous fish bearing streams.		X	

APPENDIX I

Road Miles / Road Density Information

APPENDIX I
Road Miles / Road Density Information

TABLE I-1. Road miles and road density for Eddy Gulch LSR Project 7th-field watersheds.

Watershed	Road Miles Pre-Project	Road Density Pre-Project (# road miles per watershed miles^2)	Road Miles (post-Project) short term change	Road Density (post-Project) short term change (# road miles per watershed miles^2)	Road Miles Post-Project, long term change[a]
Black Bear Creek	38.41	2.67	38.50	2.68	0
Cody-Jennings[b]	8.35	1.41	8.35	1.41	0
Crawford Creek	40.29	3.09	40.31	3.09	0
Eddy Gulch	30.85	4.46	30.85	4.46	0
Gooey-Ketchum	13.13	1.92	13.13	1.92	0
Gould-East Fork South Fork Salmon River[b]	11.79	1.96	11.80	1.96	0
Indian Creek	16.16	3.21	16.16	3.21	0
Kanaka-Olsen Creek	17.72	2.11	17.72	2.11	0
Lower North Russian Creek	11.84	1.69	11.84	1.69	0
Lower South Russian Creek	12.12	3.63	12.12	3.63	0
Matthews Creek	19.62	2.71	19.62	2.71	0
Music Creek	9.86	1.92	9.86	1.92	0
Robinson-Rattlesnake Creek	13.21	1.63	13.21	1.63	0
Shadow Creek	24.30	2.73	25.22	2.84	0
Sixmile Creek	10.47	1.66	10.47	1.66	0
Tanner-Jessups Creek	22.46	3.16	22.46	3.16	0
Taylor Creek	10.93	1.74	10.93	1.74	0
Timber-French Creek[b]	11.06	1.58	11.06	1.58	0
Upper North Russian Creek	12.51	2.56	12.51	2.56	0
Upper South Russian Creek	3.51	0.35	3.51	0.35	0
Whites Gulch	29.77	2.22	29.77	2.22	0
Yellow Dog-Sawmill Creek	4.67	0.32	4.67	0.32	0

a. There would be no long-term changes in road density because the new temporary roads will be closed after use; no National Forest System roads will be built.

b. Road density calculations for these watersheds are for analysis area only, not entire watersheds.